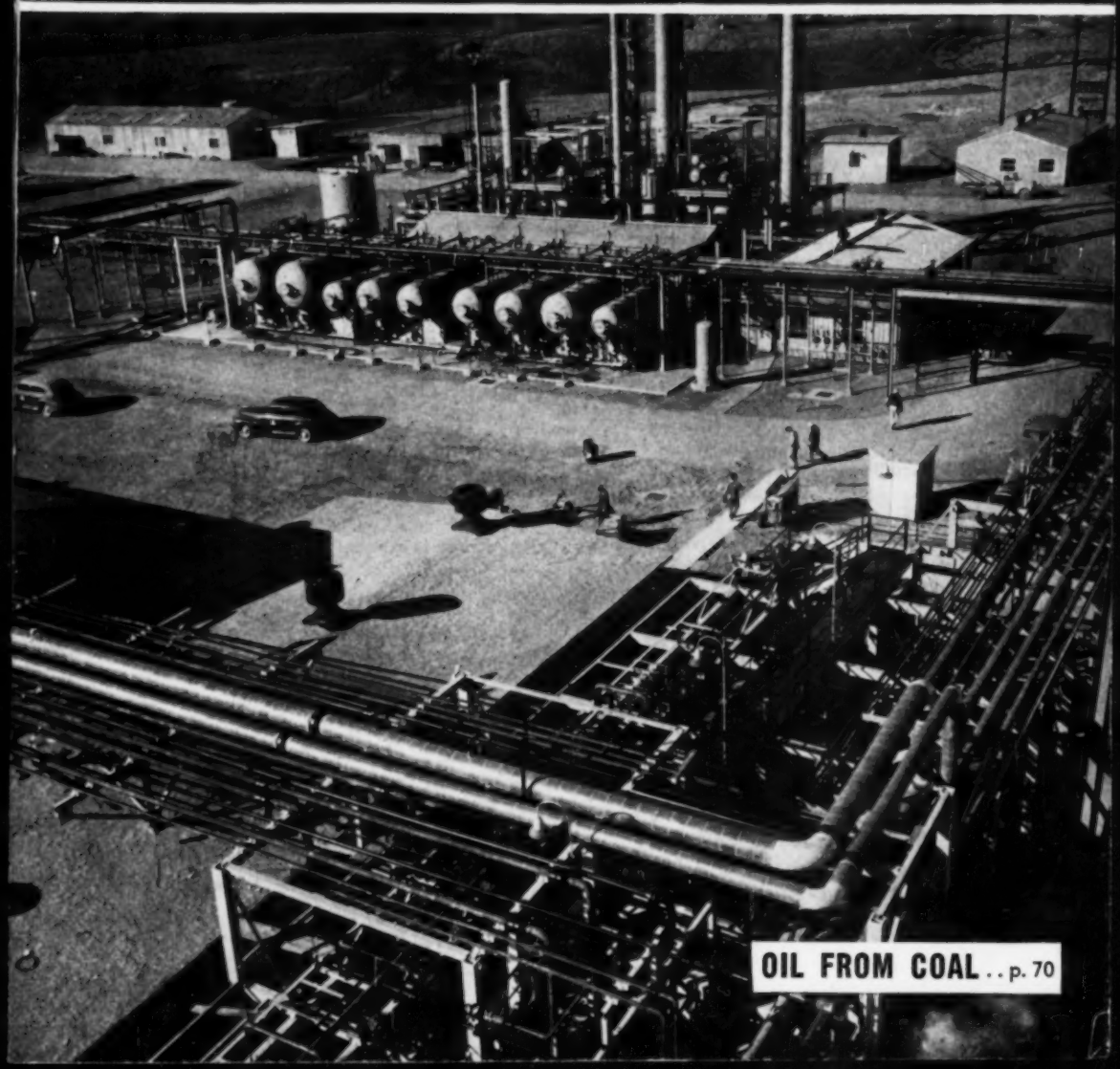
Coal Age

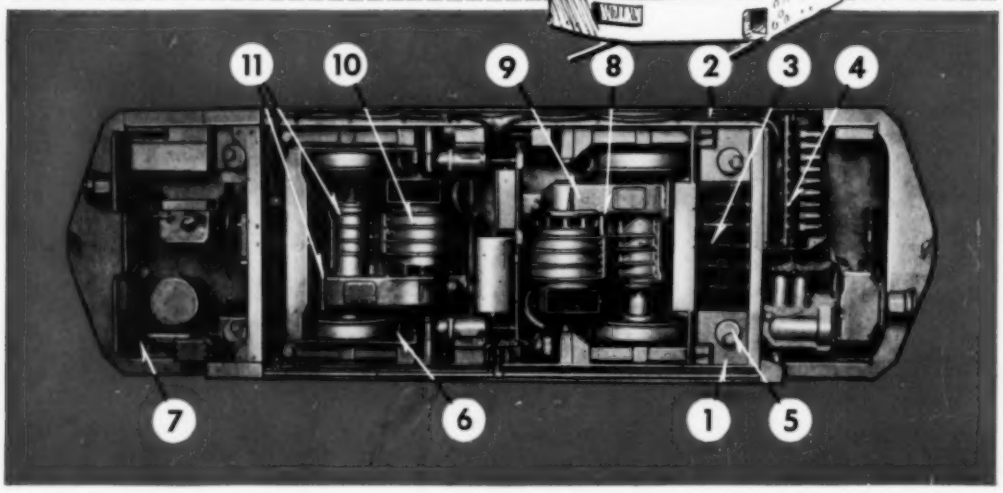
A McGRAW-HILL PUBLICATION JULY, 1940



OIL FROM COAL . . p. 70

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



Low Liner construction means *More Low Coal!*

26" over-all height means access to low veins . . . fast, economical movement of low coal when you use the Westinghouse *Low Liner.* Compact design, efficient operation and simplified maintenance are provided by these carefully planned construction features:

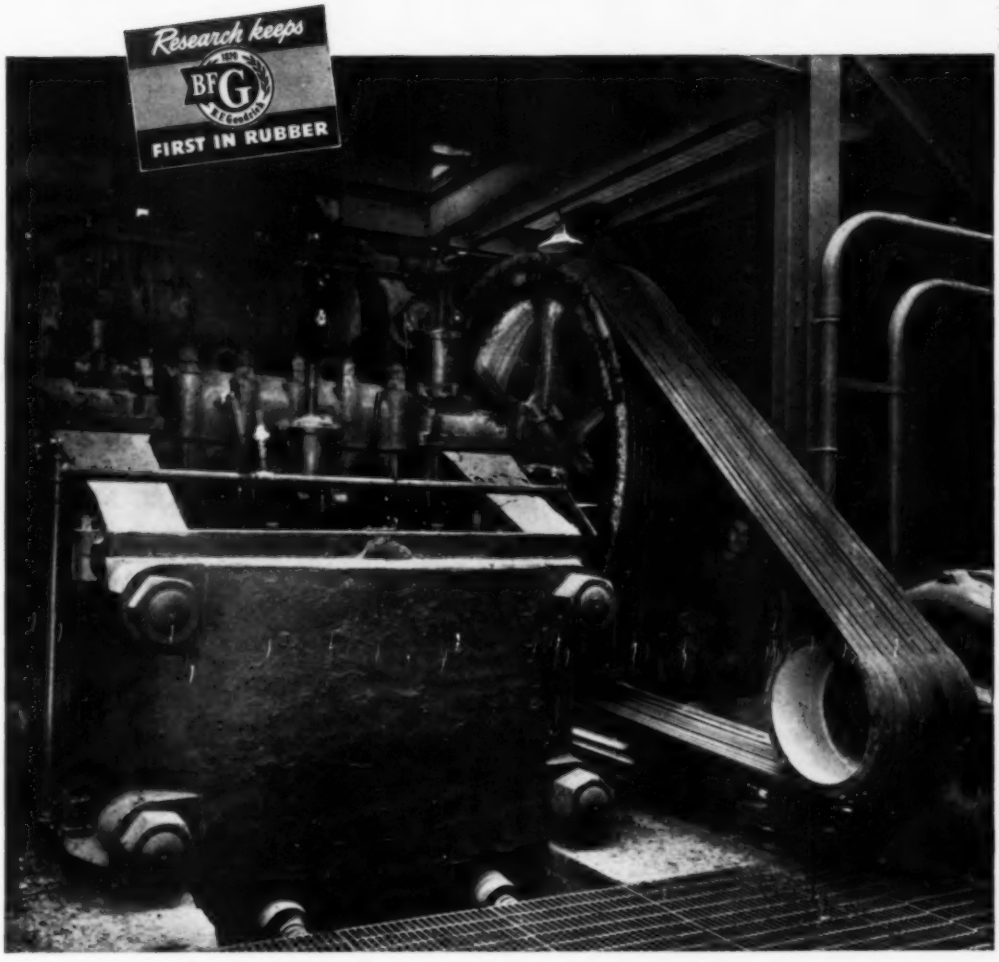
1. Piping laid in trough on top of side frame with free access to every union, cock and joint.
2. Wiring enclosed in hose—placed in trough of other side frame.
3. Resistor mounted in one accessible frame —reducing wiring to a minimum.
4. Pneumatic contactors mounted adjacent to, but well protected from resistor.
5. Sandboxes with capacity normally found on higher locomotives.
6. Solid brake pull rods—instead of chains.
7. Side frames and bumpers are held together by tapered, reamed, driven-through bolts.
8. Motor and drive unit mounted in same gear casting.
9. Gearing of spur design—shafts mounted parallel to motor armature shaft.
10. No external couplings or drive parts. All wearing parts internally mounted and continuously lubricated.
11. Complete motor and gear assembly easily removed in same manner as axle-hung motor.
12. All equipment on locomotives accessible without moving adjacent parts.

Service and parts are as near as your telephone. For complete details, consult your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-15148

Westinghouse

MINE LOCOMOTIVES



The iron giant that chews up rocks

A typical example of B. F. Goodrich product improvement

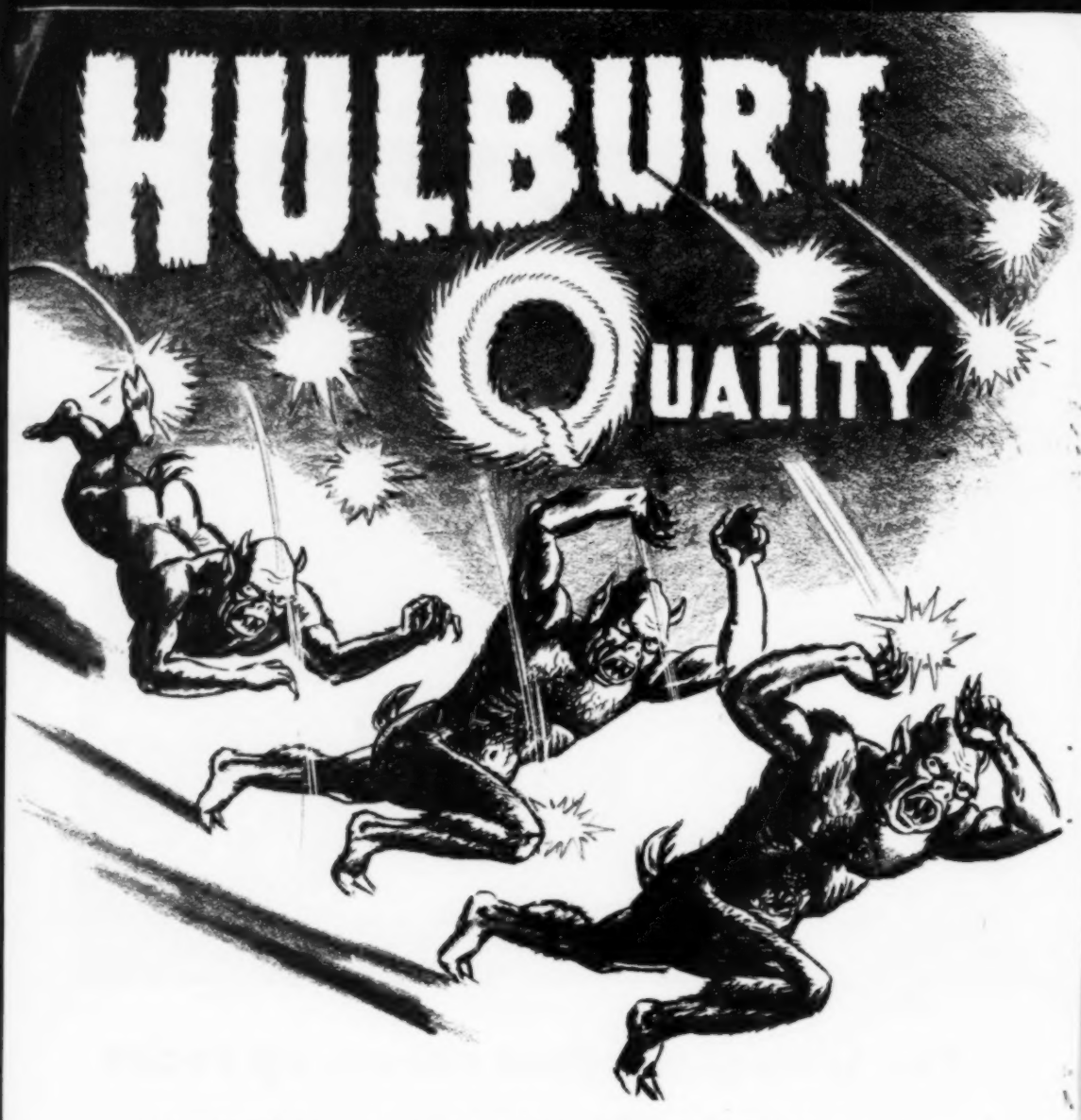
THAT big chunk of iron is a jaw crusher that breaks rocks as big as table tops. Sometimes a parade of these extra-big rocks comes along, makes the jaw chew extra hard for a time. V belts that drove it (shown at the right) used to stretch under this strain, lengthen permanently. Soon they were running off the pulleys. The quarry people came to B. F. Goodrich about it.

B. F. Goodrich engineers had developed a V belt with a new kind of reinforcement called a "grommet." The belt is more elastic, stands sudden shocks and strain.

The new BFG belts were tried on the crusher. They have already lasted far longer, and they pull their load more efficiently. They are still good for years of driving this rock-chewing monster.

This quarry company followed a good procedure which many other companies employ, too. Instead of accepting the high costs of frequent replacement, they called in B. F. Goodrich—and found exactly what they needed to cut costs and keep their plant running with fewer delays. Even if B. F. Goodrich had not had the needed product, the chances are good that they would soon have developed it, for BFG research is constantly at work to meet "impossible" problems and steadily improve even the most standard rubber products. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY



You'll celebrate Freedom from Friction Devils in your coal mine on the day you start lubricating your machinery with Hulburt Quality Grease.

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

.. gives 'em the "fire works!

FIRE
FRICTION
DEVILS
FROM
YOUR
MINE
WITH

Hulburt Quality GREASE

Remember this—Hulburt is not the "FOURTH," but the FIRST and the ONLY Quality Grease specifically made and sold and used to do but ONE job only and to do it supremely well—namely, perfectly lubricate all types of coal mining machinery. How well Hulburt Grease does this is a matter of coal mining history! Declare your independence of lubrication troubles—just call in HULBURT.

IN A CLASS BY ITSELF

for 4 good reasons

New HAZACORD MINING DRILL CORD

*ZBF
ZINC BORATE FORMULA
Flame tests have shown that Zinc Borate imparts greatly increased fire-resistant properties to neoprene compounds with burning rates reduced by as much as 20% and weight losses by as much as 40%. Afterglow is materially reduced also. Millions of feet of cable protected by this type of sheath were used during the war by the Navy for special operating conditions to gain extra fire protection. Hazaprene ZBF Sheaths mean not only greater safety because of unusual flame-resistance and lack of afterglow — but also longer life through increased resistance to abrasion, wear and tear.
HAZACORD MINING DRILL

SAFETY: This new drill cord is protected with an extra thickness of Hazaprene ZBF* Sheath providing flame-resistance to a degree never before attained in mining cable. And when you add these facts: that neoprene treated, glass-cord strength members are used . . . that Okobestoprene Tape (made of asbestos fibres and neoprene) wraps the interior cable assembly — you see why Hazacord Special Mine Drill Cord is by far the *safest* you can purchase.

DURABILITY: In addition to the high flame-resistance gained, more protection against mechanical damage is also provided by the extra thickness and the unusual toughness of this *mold-cured* Hazaprene ZBF Sheath, absorbing without damage heavy blows from mining equipment, lumps of coal or rock. Its abrasion-resistance and high tensile strength successfully withstand sharp edges, dragging and pulling. The neoprene sheath is unaffected by moisture, oil, acids, sunlight. The glass-cord fillers add to Hazacord's pulling strength . . . prevent moisture-absorption through cable ends. You'll get *more trouble-free service* from this cord than you ever thought possible.

FLEXIBILITY: Along with its toughness and safety features, you'll find Hazacord Special Drill Cord has extreme flexibility to assure good working qualities.

MEETS OFFICIAL REQUIREMENTS: Hazacord Mining Drill Cord more than meets the flame-test requirements of the State of Pennsylvania and U. S. Bureau of Mines and is so certified by App. No. P-104 BM molded in the sheath at frequent intervals.

It will pay you to get full information about the new Hazacord Mining Drill Cord today. Ask your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

insulated wires and cables for every mining use

7637

Coal Age

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Volume 54

CONTENTS • JULY • 1949

Number 7

Making Oil From Coal—W. A. STANBURY JR. 70
Water Stopped by Chemical Solidification—J. W. JOHNSON, C. M. RIEDEL 78
Tunneling at Newkirk—RUSSELL S. DAVIES 81
Flexible-Shaft Drilling 84
New Clinic Serves Coal Area 86
Heating Mine Buildings—M. GUTHRIE and R. P. CAMPBELL 88
Pipe Installation Speeded 94
Strip-Pit Safety—F. J. FORESMAN 96
Face Marked to Facilitate Smooth Top Cutting 106
Jack-Pipe Head Boosts Cutter Safety 106
Copper Air-Sample Bottle Facilitates Borehole Tests 108
Seat Built for Cutting-Machine Helper 108
Device Speeds Bushing Changes 109
How to Spot and Install Trolley Frogs 110
Tune-up Tips for Tractors 112
Editorial 69
Foremen's Forum 102
Coal Men on the Job 120
News Round-Up 115
Equipment News 176

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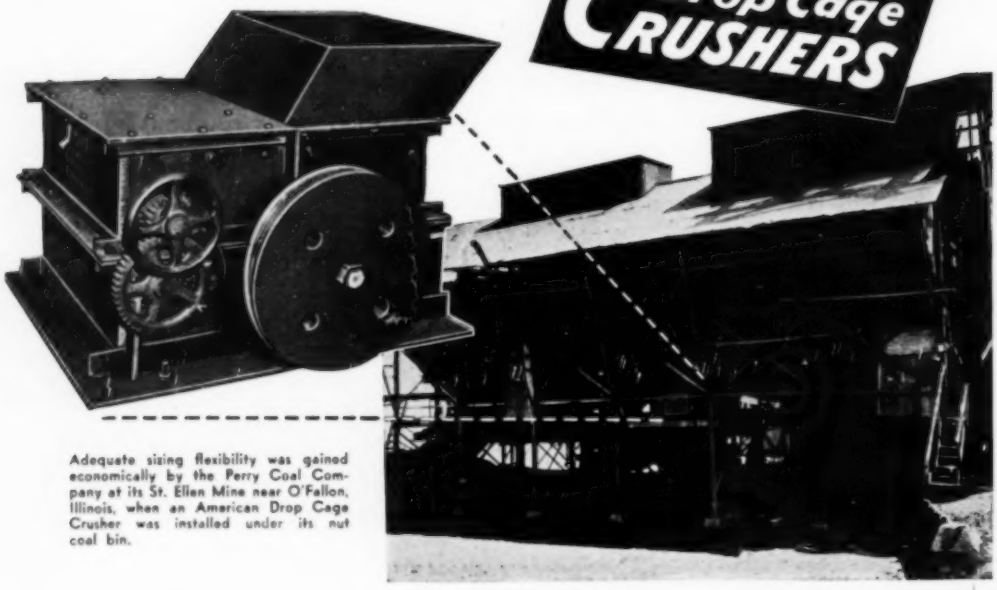
GET FLEXIBILITY of SIZING plus UNIFORM HIGH TONNAGE

install AMERICAN Drop Cage CRUSHERS



Adequate sizing flexibility was gained economically by the Perry Coal Company at its St. Ellen Mine near O'Fallon, Illinois, when an American Drop Cage Crusher was installed under its nut coal bin.

Rapidly fluctuating market needs is no problem to operators where flexible American Drop Cage Rolling Ring Crushers are on the job. They're designed especially for the secondary step in the full range of reduction to add flexibility to coal preparation.

EASY, ECONOMICAL TO INSTALL—Compact Americans are engineered to occupy the smallest possible space, right under the bin, with extremely low headroom requirements including by-pass—assuring minimum installation costs without extensive preparation plant alterations.

HIGH TONNAGE — LOW OPERATING COST—Doubly adjustable for flexibility of sizing to meet each day's market conditions, American Ring Crushers reduce coal through cleavage instead of blunt shattering force, giving a controlled ratio of fines—high tonnage output of uniform marketable sizes. And, by reducing at low, power-saving speeds, Americans offer additional savings in operating costs.

With capacities from 50 to 500 TPH, there's a type and size of American that's custom-built to make your coal marketing more flexible, more profitable.

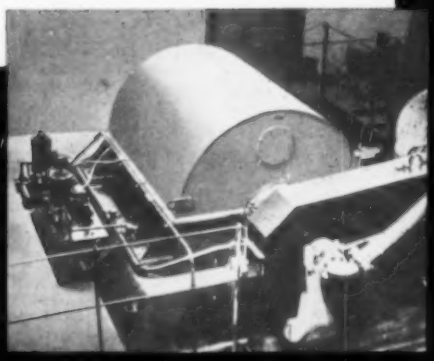
Get the facts—send for Coal Crushing Bulletin.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Avenue
St. Louis 10, Mo.

HOW DO *You* HANDLE ALL THAT 1/4" x 0?



To cash in on it you've got to clean it, and in most cases it represents a substantial tonnage.

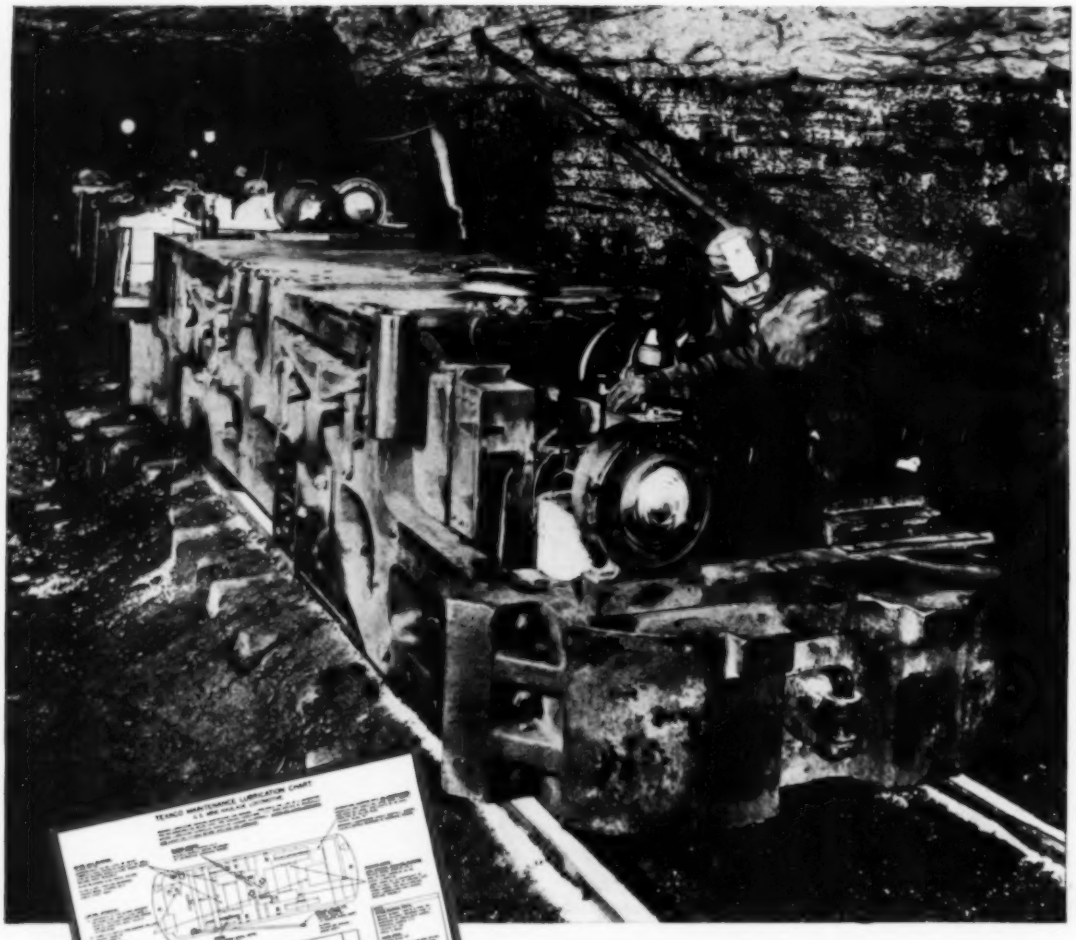
Getting the water out of this fine coal, after washing, used to be the biggest headache, and the most expensive part of the job. Now, the Bird Coal Filter has changed all that.

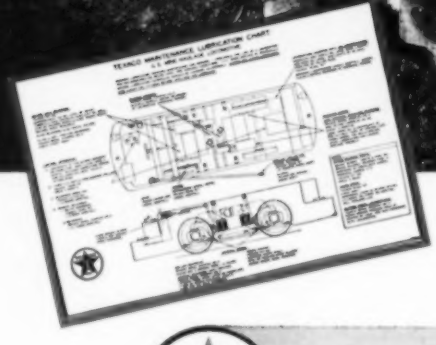
The Bird does the entire job — gets the coal down to 8 to 10% moisture assuming it contains approximately ten per cent minus 200 mesh fines. It delivers a well-blended coal, ready for direct loading or for feeding to thermal dryers. It handles large tonnages — 40 or 50 tons per Filter per hour. It permits a closed water circuit. It runs for months without a maintenance shutdown.

Thousands of tons per day of fine coal are now being dried by this modern, super-efficient method. Better look into it. Ask us to mail you the Bird Coal Filter Bulletin.

BIRD MACHINE COMPANY, South Walpole, Massachusetts

The BIRD **Continuous Centrifugal COAL FILTER**





TEXACO MAINTENANCE LUBRICATION CHARTS: Leading manufacturers of underground coal mining machinery approve Texaco products for use on cutters, loaders, locomotives, etc., and have cooperated in preparing these charts. Charts show clearly where and when to use the proper Texaco lubricant. Order the charts you need by make and model of each machine.

TEXACO

TEXACO LUBRICANTS

More Tonnage ...less cost

Increase machinery efficiency by lubricating anti-friction bearings with Texaco Regal Starfak

USE *Texaco Regal Starfak* in your locomotives, loaders, cutters, shakers and other machinery equipped with grease-lubricated ball and roller bearings. It makes the bearings last longer and run more smoothly . . . increases machinery efficiency . . . helps you produce more tonnage at less cost.

Texaco Regal Starfak is an ideal anti-friction bearing lubricant. It remains exceptionally stable under a wide range of operating conditions. Special processing gives it high resistance to oxidation, gum formation, separation and leakage. It reduces starting "drag" . . . keeps bearing repair and replacement costs amazingly low.

To protect low-speed anti-friction bearings in heavy-duty service, use *Texaco Marfak*. It stays *in* the bearings . . . reduces wear . . . assures longer bearing life and lower maintenance costs.

Texaco has cost-saving lubricants for all your mining needs. Let a Texaco Lubrication Engineer help you select the ones you need for best results. Call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, *National Sales Division*, Dept. C, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

Cut Costs

Not tied down to specialized duty —

SKIDDING MINE TIMBERS

CLEANING-UP COAL AROUND DRAGLINE

PLOWING SNOW

WINCH AND HOIST WORK

PULLING SCRAPERS

CLEARING

LEVELING SPOIL BANKS

UNDERGROUND MINING

HAUL ROAD CONSTRUCTION

GENERAL CLEAN-UP WORK

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LIFTING WORK

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A Great Tractor WITH A GREAT ALLIED LINE

Available with fully matched Baker, Gar Wood and Carco bulldozers . . . Drott Skid-Loader . . . Baker snowplow . . . Gar Wood scraper . . . Carco winch . . . Tractomotive Tracto-Shovel with interchangeable attachments—1 cu. yd. standard bucket, ¾ cu. yd. narrow bucket, 2 cu. yd. light materials bucket, 1 cu. yd. rock bucket, 1 cu. yd. magnesium bucket, teeth for all buckets, heavy-duty bulldozer blades (narrow and wide) and V-type snowplow.

On All Kinds of Work.

WITH THE VERSATILE ALLIS-CHALMERS HD-5

— Yet gives special performance on every job

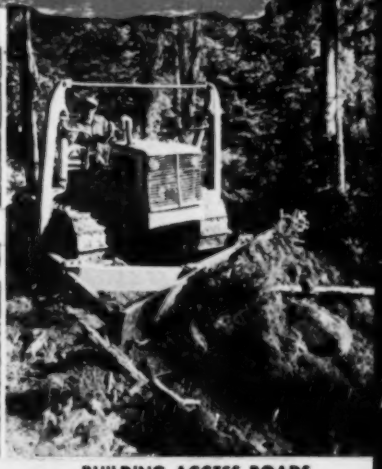
Completely New IN DESIGN

New Performance . . .
New Work Capacity . . .
New Simplified Servicing

Weighs 11,250 lbs.
Provides 40.26 drawbar hp.
50.25 on belt
2-Cycle GM Diesel Power

HANDLING MINE TIMBERS

BACKFILLING



BUILDING ACCESS ROADS

LEVELING FOR STRIPPERS, DRILLS, ETC.

MATERIAL HANDLING

CRANE WORK

LOADING ROCK

LOADING DIRT

STOCKPILING COAL

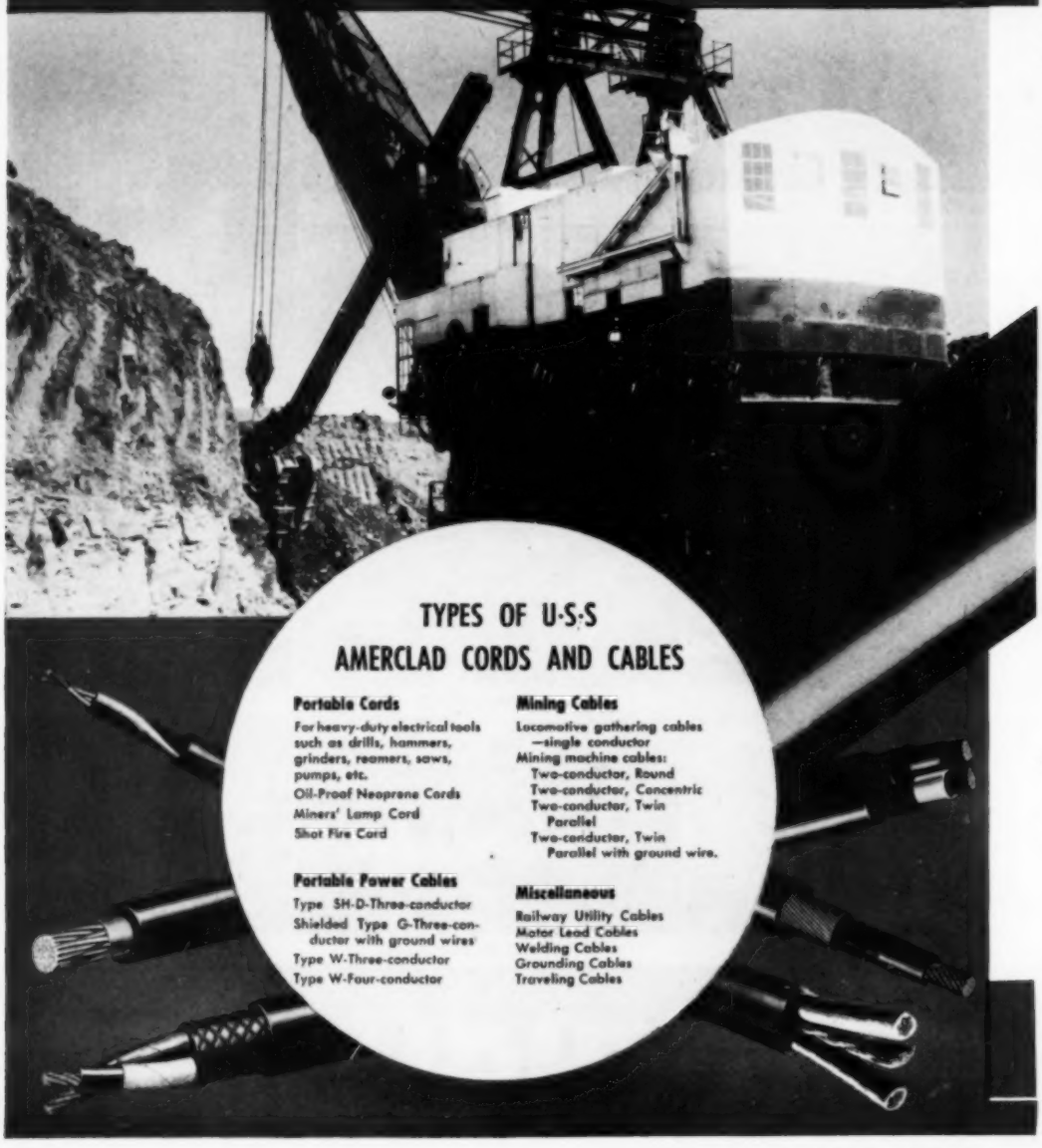
STRIPPING OVERBURDEN

LOADING COAL

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

How Amerclad GPS Shielded



TYPES OF U·S·S AMERCLAD CORDS AND CABLES

Portable Cords

For heavy-duty electrical tools such as drills, hammers, grinders, reamers, saws, pumps, etc.

Oil-Proof Neoprene Cords

Miners' Lamp Cord

Shot Fire Cord

Portable Power Cables

Type SH-D-Three-conductor

Shielded Type G-Three-conductor with ground wires

Type W-Three-conductor

Type W-Four-conductor

Mining Cables

Locomotive gathering cables —single conductor

Mining machine cables:

Two-conductor, Round

Two-conductor, Concentric

Two-conductor, Twin Parallel

Two-conductor, Twin Parallel with ground wire.

Miscellaneous

Railway Utility Cables

Motor Lead Cables

Welding Cables

Grounding Cables

Traveling Cables

Cable } ...assures maximum safety ...reduces cable costs

Enlargement shows Type PS Shielding with conducting fabric tape — an added safety feature of Amerclad GPS Cable. It also prevents corona and ozone damage to the cable.

● *Three-way safety protection* Amerclad GPS Cables are built up with three flexible conductors separately insulated and separately covered with PS *conducting* fabric tape. This is the first safety precaution. Tests show that even such small items as nails driven through the tape and into the conductor without touching the ground wires will cause the protective circuit breaker to trip, giving sure protection to workers.

The three bare copper ground wires in the valleys between conductors are a second safety feature offering a positive ground for the machine. Any short between conductor and machine will be immediately grounded.

The third safety feature is the Amerprene cover made of rubber as tough as tire treads and resistant to oil, grease and acidulous water as well. In addition, U·S·S Amerclad Cables are approved by the State of Pennsylvania under the flame-resisting regulations.

Cost saving features

Amerclad GPS Shielded Cables are lighter, smaller in diameter and lower in cost than full metallic shielded cables. You get longer cable life and lower maintenance costs because the tough covers prevent damage.

Write for our new book on U·S·S Amerclad Cord and Cable. It gives you complete information on all Amerclad Cables used for mining.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
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TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS **AMERCLAD CABLES**

UNITED STATES STEEL

C and O's most *Vital Statistic!*

Coal is the life blood of the C & O Railway. Its whole physical structure is geared to serve this great industry. Even its own growth and expansion has been contingent upon the growth and expansion of the coal industry.

In 1948, C & O loaded 12.22 per cent of the total bituminous coal production in the United States. Coal traffic alone represented 68.9 per cent of the total tonnage handled.

In order to make possible the efficient handling of this great tonnage, C & O spent in 1948, $86,000,000 on the expansion and improvement of its coal handling facilities. Railroad lines were extended to serve the new coal mines. This part of the program included 14 separate branch lines which according to estimate will make available for transportation over C & O lines about 850,000,000 tons of coal . . . new yard and terminal facilities have been added, a modern high capacity pier for handling the tidewater coal at Newport News, Virginia is all but completed. Car retarders and major track installations have been made at Toledo . . . signals and miscellaneous facilities including 386 miles of new Centralized Traffic Control are among the other improvements.

Yes . . . coal is C & O's most vital statistic. Together they have served the ever growing need of American enterprise. And their continued growth and development will largely contribute to America's future economy.

C AND O FOR PROGRESS

CHESAPEAKE & OHIO RAILWAY

Largest Originating Carrier of Bituminous Coal in the World

Daily double for pit and quarry work

HERE's the tire that pays off two ways on pit and quarry hauling everywhere — Goodyear's new, improved Road Lug. This remarkable double-duty work tire is specially designed for maximum tire performance both OFF *and* ON the road.

For rugged traction OFF the road— the Road Lug has big husky lugs, designed to grip on dirt, gravel and other off-the-road surfaces.

For smooth rolling ON paved roads — the lugs are joined at the center for long even wear.

Other outstanding features of this dual-purpose tire are: extra-strong carcass and undertread — tapered grooves between the lugs to prevent the picking up and holding of stones — wider-spaced, deeper lug bars. No doubt about it, Goodyear's new, improved Road Lug is your best bet for all-purpose hauling. Remember, always BUY and SPECIFY Goodyear *—it pays!*

The Super-Stamina Tire for OFF-THE-ROAD Hauling

THE HARD ROCK LUG

This extra-husky tire is best for all OFF-THE-ROAD tire-ripping, tire-bruising jobs. Ask your Goodyear dealer about it now!

Road Lug T.M. The Goodyear Tire & Rubber Company

GOODYEAR

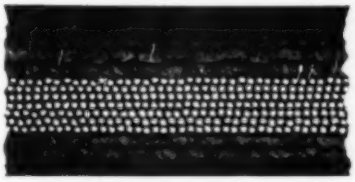
BOWDIL USERS EVERYWHERE GET THIS ANSWER

SALES ENGINEERS IN — Whitesburg, Kentucky — West Frankfort, Illinois
Charleroi, Pennsylvania — Denver, Colorado — Big Stone Gap, Virginia
Danville, West Virginia — Canton, Ohio — Birmingham, Alabama
Helper, Utah — Kansas City, Missouri — Centerville, Iowa — Topeka, Kansas
New Castle, England — Alberta, Canada

BOWDIL CANTON OHIO
COAL CUTTING EQUIPMENT

Du Pont "Cordura" Rayon packs strength into a CONVEYOR BELT CARCASS

Cross-section of belt reinforced with 7 plies of "Cordura." This belt is designed to lift 1000 tons of overburden per hour up 15° slope over 1100-foot centers. Design tension 900 pounds per inch of width. Below is magnified section.



Engineered to provide high strength at low cost, Du Pont "Cordura" Rayon can be helpful to conveyor belt users and manufacturers in many ways.

Because of the great strength of "Cordura" Rayon, a conveyor belt with a carcass of this material can be made much lighter, without sacrificing load-carrying ability. And the same high tensile strength also meets the need for long belts that eliminate costly transfer points.

"Cordura" rayon is now widely used to make V-belts stronger, and more efficient . . . to make heavy-duty tires with a thinner, tougher carcass . . . to increase the bursting strength of hose—or make it much lighter.

Check the various ways in which "Cordura" rayon can help you get improved conveyor belt service. And next time you order a conveyor belt, ask your supplier for a carcass made with Du Pont "Cordura" High Tenacity Rayon. In the meantime, write Du Pont for further information about the use of "Cordura" in conveyor belts.

Address Room 4527, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

DU PONT

Look to "Cordura" Rayon for these conveyor belt advantages:

- ★ *Greater tensile strength*
- ★ *Longer life*
- ★ *Heavier loads*
- ★ *Improved troughability*
- ★ *Longer lifts with fewer transfer points*
- ★ *Lighter belts that are easier to set up*
- ★ *Resistance to flexing*
- ★ *Resistance to loading impacts*
- ★ *Reduced operating power expense*

DU PONT "CORDURA" HIGH TENACITY RAYON

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

For RAYON . . . for NYLON . . . for FIBERS to come . . . look to DU PONT

Less maintenance, greater availability* for every type of loader

***Availability**... loader spends more time at the face, less time in the shop.

Three good examples of how Superla Mine Lubricants help keep loaders on the job without shutdown for maintenance are described at the right. You'll find your loader in the wide range of types to which these versatile lubricants are applied.

Why not let the experiences of midwest mines cited here be the basis for a test of Superla Mine Lubricants in your equipment. A Standard Oil Lubrication Engineer will gladly help you. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Six grades for lubricating any type of cutter or loader

No. 00. An oxidation-inhibited oil containing a detergent additive. It provides exceptionally clean operation and low oil consumption for oil-lubricated gear cases.

No. 0. A high-quality additive-type oil similar to No. 00 but of a slightly heavier grade. It is designed for Goodman loaders and cutters.

No. 2. A soft, semi-fluid grease for lubricating gathering-head gear cases where greater fluidity than that usually provided by most loader greases is desired.

No. 4. A semi-smooth grease particularly resistant to thinning out under heat and mechanical working. At the same time it can easily be poured from the barrel bung at ordinary mine temperatures. It is especially designed for Joy loaders.

No. 6. A grease of heavy consistency and good high-temperature characteristics. Its fibrous structure makes it particularly useful on mine car wheels and for general underground lubrication.

No. 8. A smooth grease having superior high-temperature characteristics. It is suitable for armature bearings and pressure-gun work where a grease of heavy consistency is desired.

Superla Mine Lubricants

STANDARD OIL COMPANY (INDIANA)

Cleaner operation in Goodman loaders

Superla Mine Lubricant No. 0 keeps oil-lubricated transmissions free of hard carbon. An oxidation inhibitor reduces oil deterioration at high temperatures. A detergent additive keeps gear-case contaminants from settling out on clutch plates and gears. Cleaner operation reduces wear on machine parts, cutting replacement costs and downtime.

Example: A midwest mine's repair shop records showed a 50% reduction in loader-maintenance costs for repair parts and labor, in 1½ years of operation. Superla Mine Lubricant No. 0 was used. There was no downtime due to oil failures.

Longer clutch plate life in Joy loaders

Superla Mine Lubricant No. 4 is a loader grease that flows freely at low temperatures, resists thinning out under heat and mechanical working. When the machine starts, this lubricant reduces wear by readily covering bearings, gears, and clutches. During long periods of continuous operation, it maintains its strong lubricating body to protect machine parts against scoring and wear.

Example: During a 6-month test period with Superla Mine Lubricant No. 4, no clutch plates were replaced in a midwest mine's Joy loaders. No time was lost in warming up when starting loaders. No shutdowns occurred because of faulty lubrication.

More efficient grease servicing of mine equipment

Superla Mine Lubricant No. 2 is a soft, semi-fluid grease of greater fluidity than most loader greases. For this reason, it makes an ideal lubricant for gathering head gear cases, "buster" clutches, and general use in cutters.

Example: Superla Mine Lubricant No. 2 handled easily in the suction guns of a midwest mine. Grease servicing of 8 cutters and 10 loaders took a minimum of time and labor. Machine gear cases stayed exceptionally clean.

STANDARD OIL COMPANY (INDIANA) STANDARD

JEFFREY

A real contribution to modern trackless mining

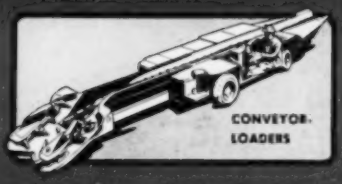
56-FHR DRILLING MACHINE

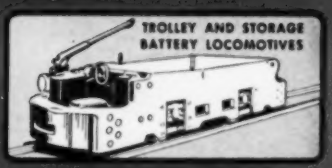
● Completely hydraulic in operation this new machine was developed specially for trackless mining. Mounted on rubber tires, the Jeffrey 56-FHR brings modern, high speed drilling to the trackless mine.

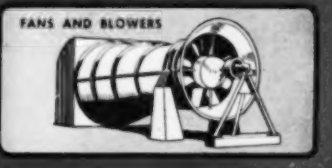
The 56-FHR has a drilling range of 13′ 1¾″ horizontally from centerline of machine and 6′ 11½″ vertically. Its many adjustments afford the utmost flexibility of operation and permit proper placement of shot holes to obtain the most efficient use of explosives.

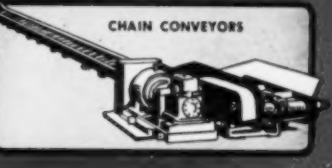
Being fully hydraulic in operation the operator can swing the drilling head in any desired position quickly, accurately and with practically no physical effort.

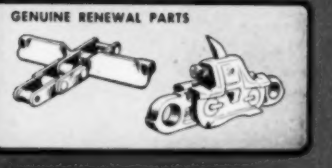
For the most in modern drilling specify the Jeffrey 56-FHR unit for trackless mine operation. Write for complete details of construction and operation.











JEFFREY

EQUIPMENT FOR COAL MINES

and

GENUINE RENEWAL PARTS

THE JEFFREY MANUFACTURING COMPANY

Established 1877

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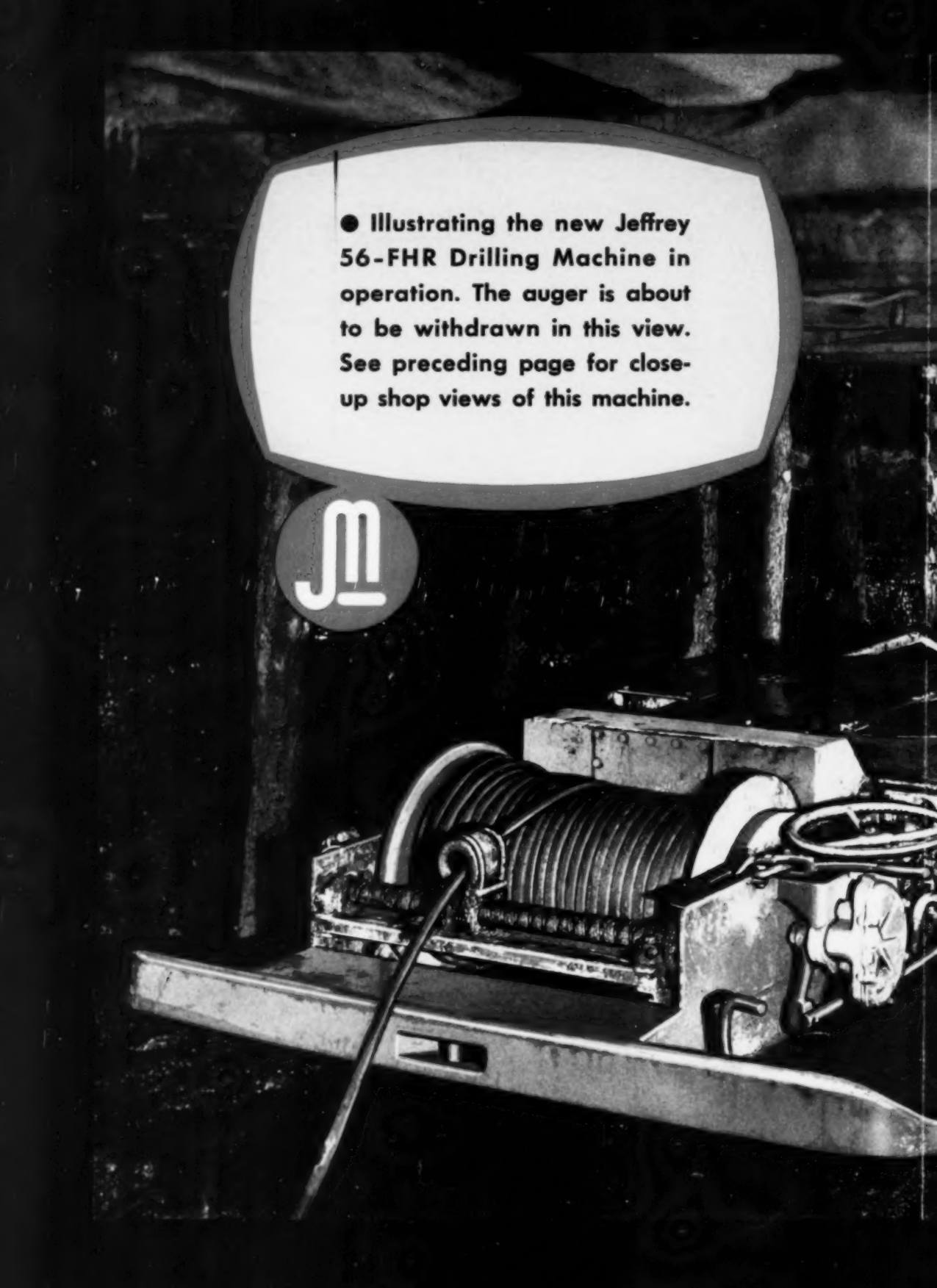
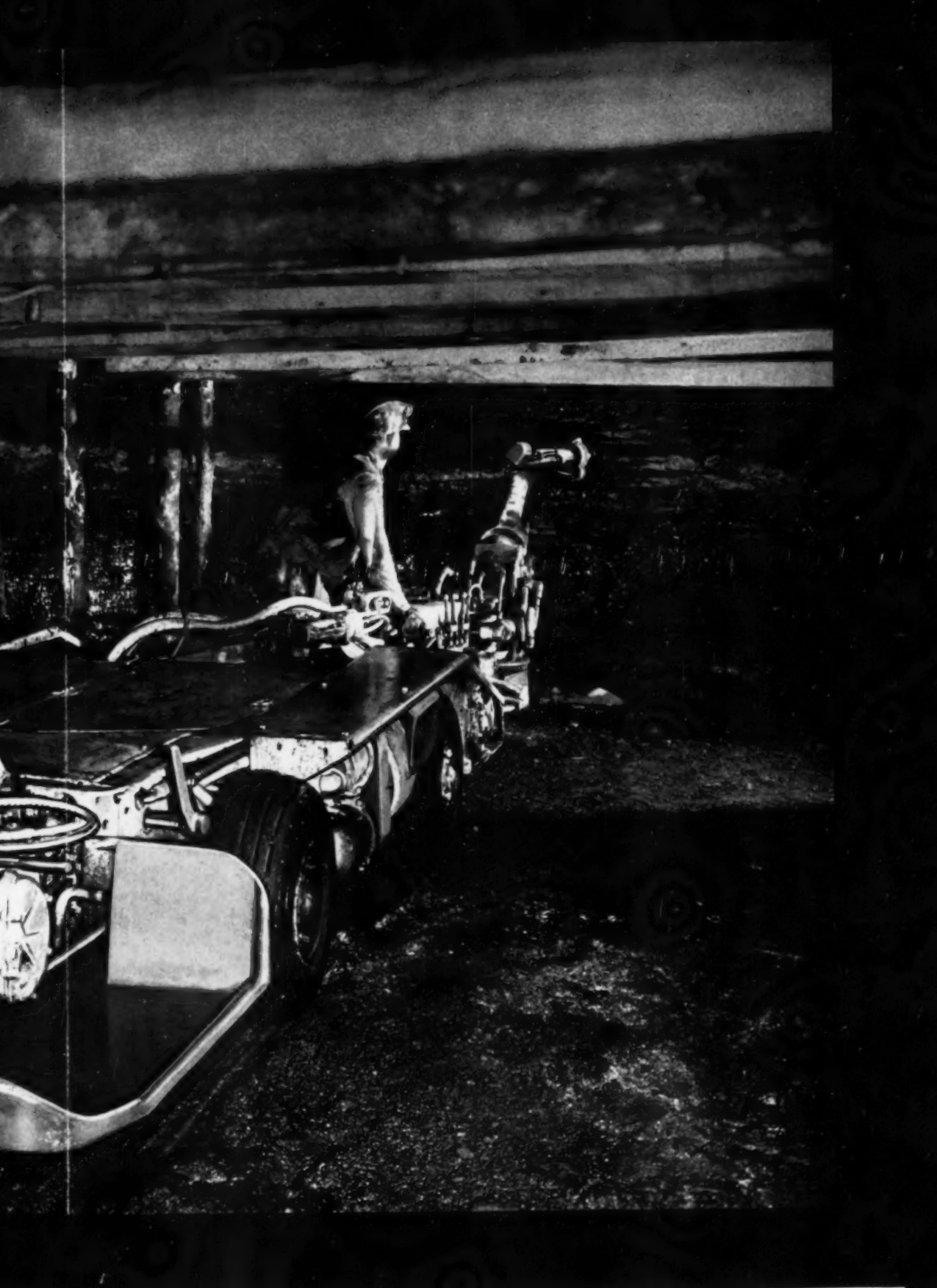
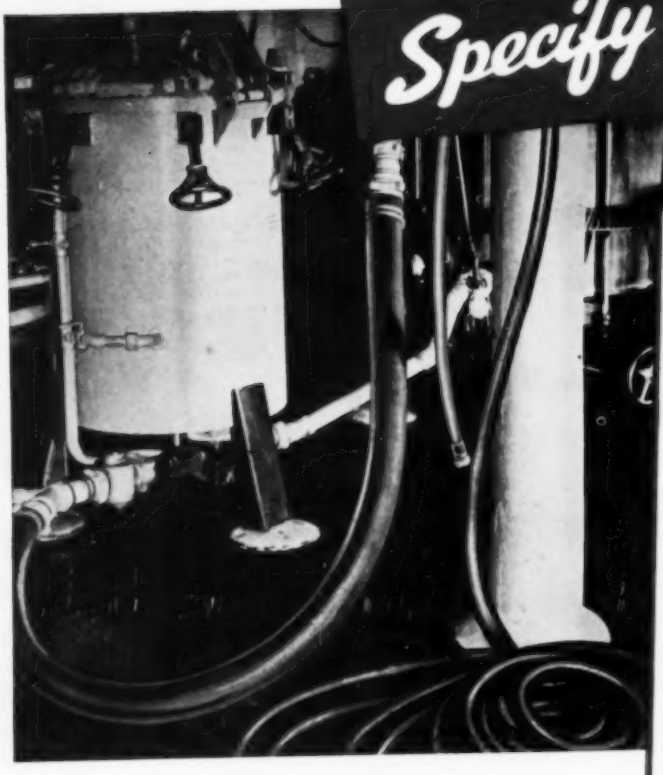


● Illustrating the new Jeffrey 56-FHR Drilling Machine in operation. The auger is about to be withdrawn in this view. See preceding page for close-up shop views of this machine.



Specify Thermoid



The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

Versicon Hose Cuts Costs

Now available . . . a multi-purpose hose designed for superior performance with virtually any liquid or gas . . . Thermoid Versicon Hose. It is made with neoprene tube and oil-resistant cover—with high tensile rayon cords to insure maximum strength, light-weight and flexibility.

Versicon, another of the famous quality rubber products made available to industry through Thermoid research, is the answer to a long felt need. Now your nearest Thermoid distributors can supply you with *one hose* for your requirements. Now you can cut your costs and reduce inventory. Versicon eliminates the need for special hose . . . Versicon *is* the special hose. Available from 3/16" to 2½" for use with air, water, oil, gases and virtually all fluids in lengths from 50' to 500' depending on size.

It will pay you to ***Specify*** Thermoid!

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

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It Pays to *Check* your MINE CAR WHEELS

WORN TREADS
"FLATS"
WORN FLANGES

Slow Down Coal Output!

a.C.f. Chilled-Tread wheels give those "extra miles" of wear, less friction on the rails which enable you to start and haul heavier loads at higher speeds.

It's the controlled heat treatment in the manufacturing process that makes the difference. a.C.f.'s wide experience in wheel design insures the proper proportion of metal in the tread and flange, hub and plate. This assures maximum strength and durability where needed.

Mine car wheels are a vital part of a smooth-rolling transportation system. Check them today! Replace worn equipment with scientifically-designed a.C.f. wheels. Our Sales Representatives will be pleased to discuss any of your transportation problems.

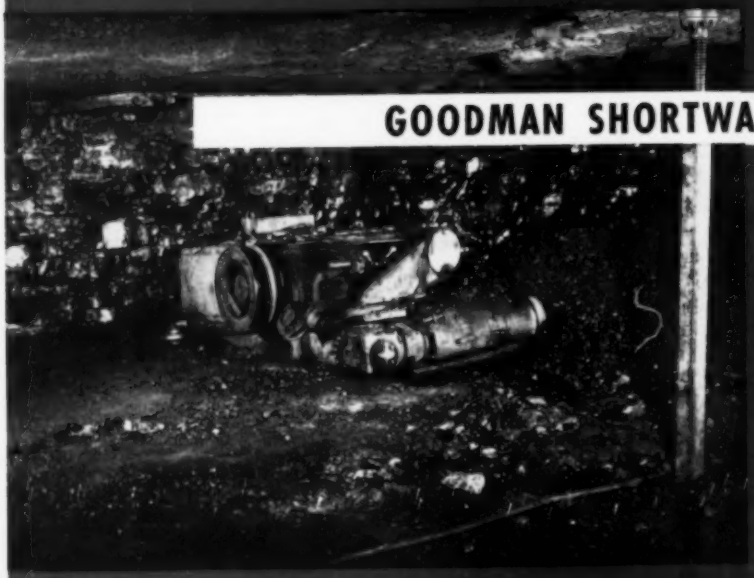
a.C.f. MINE CARS

AMERICAN CAR & FOUNDRY COMPANY, NEW YORK • CHICAGO • CLEVELAND • WASHINGTON
HUNTINGTON, W. VA. • ST. LOUIS • BERWICK, PA. • PITTSBURGH • PHILADELPHIA • SAN FRANCISCO

for Greater Mining Efficiency

For capacity,

GOODMAN SHORTWALLS



The Type 3T2 with Regivator. Controls are hydraulic.

GOODMAN DUCKBILL-SHAKER CONVEYORS

A loading machine with a rear conveyor as long as the room is deep.

speed, low cost, safety

GOODMAN BELT CONVEYORS

Quick and easy to install, extend or relocate.

Best IN CONVEYOR MINING EQUIPMENT

Ask for illustrated literature. Call in a Goodman sales engineer.

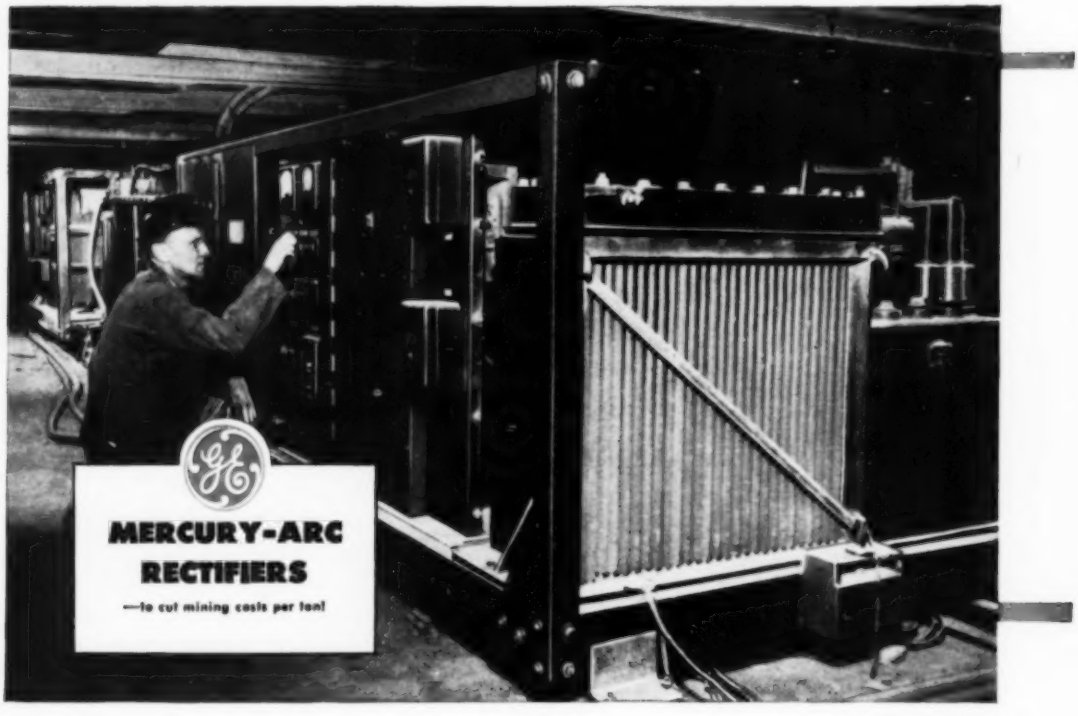
GOODMAN MANUFACTURING COMPANY

HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

In Great Britain: The Distington Engineering Company, Ltd.

Power cost— 6.4¢ per ton!

This G-E portable rectifier, one of three in the Shamrock No. 1 mine of the Truax-Traer Coal Co., is rated at 300-kw, 275-v d-c, and designed for 4000-volt and grounded negative operation. The units have needed little or no maintenance since their installation except for tube replacement and periodic inspection.



Economical G-E mercury-arc rectifiers helped keep power costs down to this low figure, are quickly relocated at little expense, offer no maintenance problems, says Mr. Howard Petty, Electrical Superintendent, Truax-Traer Coal Company.

In June 1946 the Truax-Traer Coal Company installed a General Electric portable, sealed-ignitron mercury-arc rectifier in its Shamrock No. 1 mine at Kayford, West Virginia. Two identical units were added in March 1947. For sixteen hours per day, seven days per week, these rectifiers have been in continuous operation, available for service practically 100 per cent of the time.

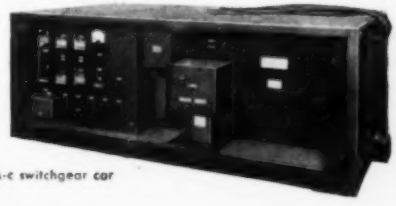
Because of the advantages offered by General Electric mercury-arc rectifiers, Truax-Traer has now ordered four more equipments of latest design. With these in service, *all* power for this mine will be supplied by G-E portable sealed-ignitron mercury-arc rectifiers.

Why not check how G-E mercury-arc rectifiers can cut *your* over-all mining costs per ton? A wide range of ratings is available. For more details, send for Bulletin GEA-4047. *Apparatus Department, General Electric Co., Schenectady 5, New York.*

According to Mr. Howard Petty, the Company's electrical superintendent, G-E mercury-arc rectifiers have provided the following advantages:

1. **LOW POWER COSTS.** The three units helped to keep power costs at an all-time low: only 6.4¢ per ton.
2. **FAST, ECONOMICAL RE-LOCATION.** After a place is prepared, the entire unit is moved and back in service in only four hours.
3. **MINIMUM MAINTENANCE.** No major rotating parts.
4. **EASY PORTABILITY.** Entire unit can be moved close to the working face.
5. **PERSONNEL SAFETY.** Units are completely enclosed to prevent accidental contact.
6. **HIGH OVERLOAD CAPACITY.** The equipment can be operated at 150% of rated maximum load without damage.
7. **LOW-SLUNG DESIGN.** Maximum height of only 48 inches permits these compact units to be used in cramped areas. (Standard 42-inch units also available.)
8. **DEAD-FRONT PANELS.** Give maximum personnel protection, as well as keep out coal dust and dirt.

THREE INTEGRATED CAR UNITS make up a G-E portable mercury-arc rectifier. Compact and efficient, this equipment permits conversion from a-c to d-c thousands of feet closer to the working face. It makes long, low-voltage d-c feeders unnecessary, assures full voltage at the working face for efficient operation of locomotives, cutters, loaders and other mining machines.



A-c switchgear car

Transformer car

Rectifier d-c switchgear car

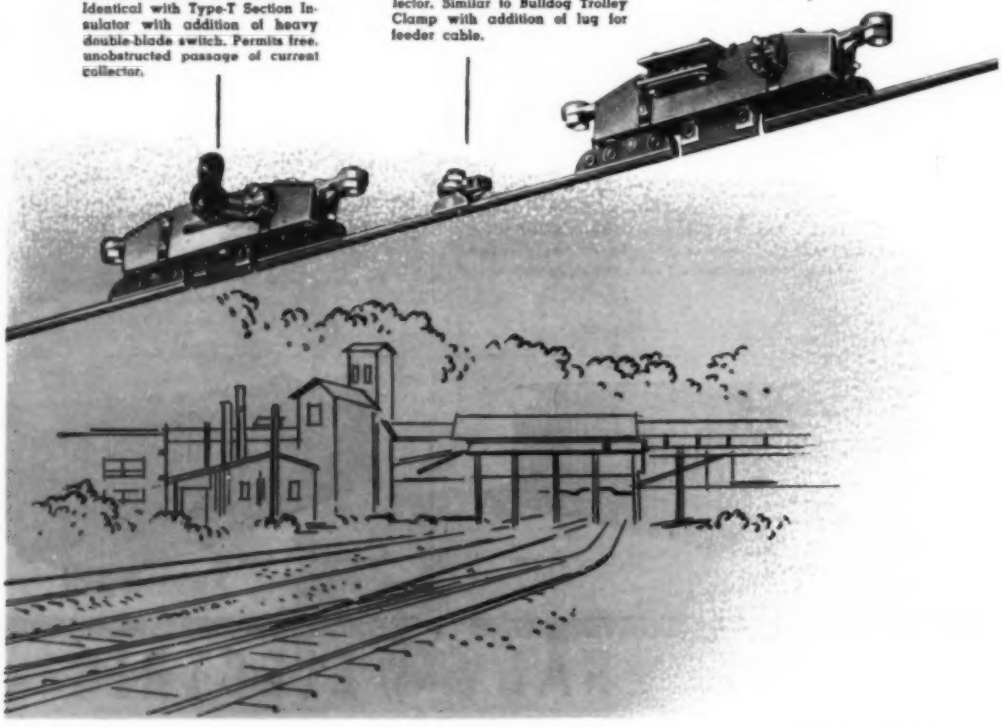
GENERAL ELECTRIC

Now... for the first time... you can prevent ALL bumps in your Trolley Overhead System

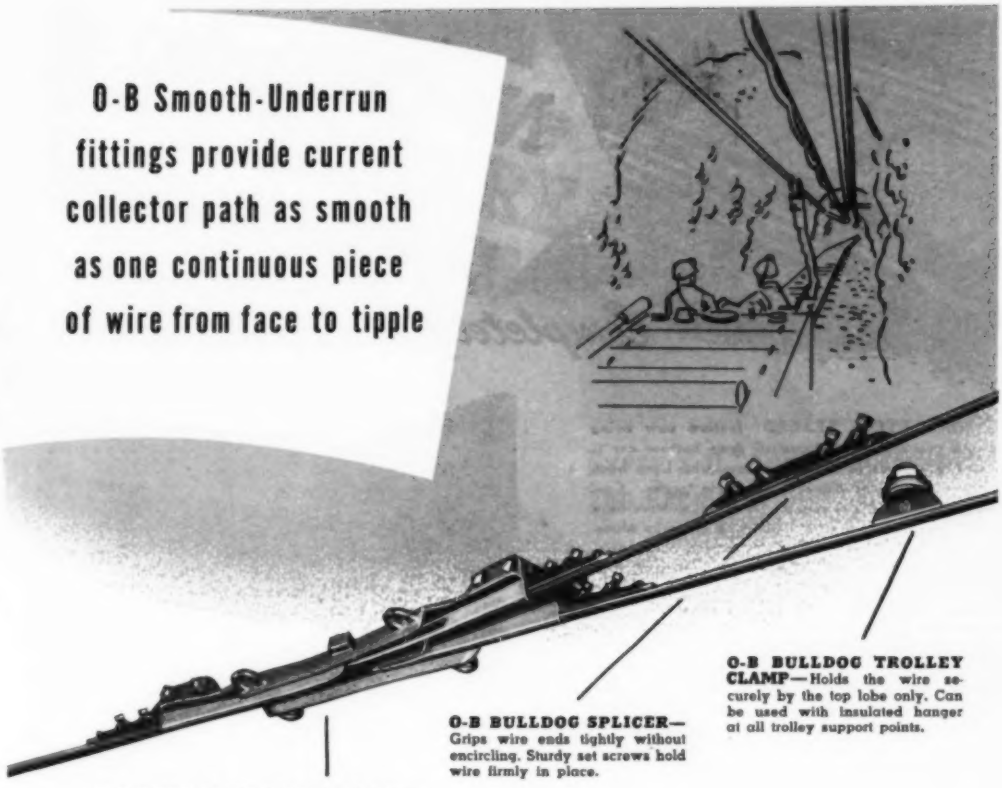
O-B TYPE-T SECTION INSULATOR SWITCH*— Identical with Type-T Section Insulator with addition of heavy double-blade switch. Permits free, unobstructed passage of current collector.

O-B BULLDOG FEEDER CLAMP— Leaves bottom part of trolley wire as free, unobstructed running surface for current collector. Similar to Bulldog Trolley Clamp with addition of lug for feeder cable.

O-B TYPE-T SECTION INSULATOR*— End runners grip wire by top lobe only. Center runner is adjustable to same underrun level as trolley wire.



O-B Smooth-Underrun fittings provide current collector path as smooth as one continuous piece of wire from face to tipple



O-B BULLDOG TROLLEY CLAMP—Holds the wire securely by the top lobe only. Can be used with insulated hanger at all trolley support points.

O-B BULLDOG SPLICER—Grips wire ends tightly without encircling. Sturdy set screws hold wire firmly in place.

O-B TYPE-M TROLLEY FROG*—Designed with runners having a cross section—similar in size and shape to that of trolley wire. Anchor tips hold the wire firmly against the runner, producing a smooth, level running surface for the current collector.

*A new Smooth-Underrun Fitting developed especially by O-B to give your current collectors a smooth, unobstructed running surface. Write for details and specifications.

Have you ever wished you could install just one continuous piece of trolley wire in your mine? Bumps caused by wire encircling fittings in the overhead system are headaches to the haulage operator. They are a constant source of arcing and wire burning, lessening the life of both current collectors and trolley wire. Dewirements are more frequent.

While it is hardly possible to install wire in one continuous piece, you can obtain the same effect by building with fittings selected from O-B's complete line of Smooth-Underrun Materials. Instead of encircling the wire, O-B Fittings grip grooved, Figure 8 and No. 9 Section wire by the top lobe only, leaving the bottom part free and unobstructed. Your current collector is assured of a smooth, level transition from wire to frog or cross-over runner by means of separable anchor tips.

Because of these features, your locomotives can operate safely at higher speeds; wire wear will be lessened; fewer dewirements will occur. For your next trolley overhead system, insist on O-B Smooth-Underrun Fittings. They'll make your wire seem like one continuous piece from face to tipple.

Ohio Brass

MANSFIELD, OHIO

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

3008-M

No Clean-up HERE...

THE SANFORD-DAY *Completely Sealed* "AUTOMATIC"

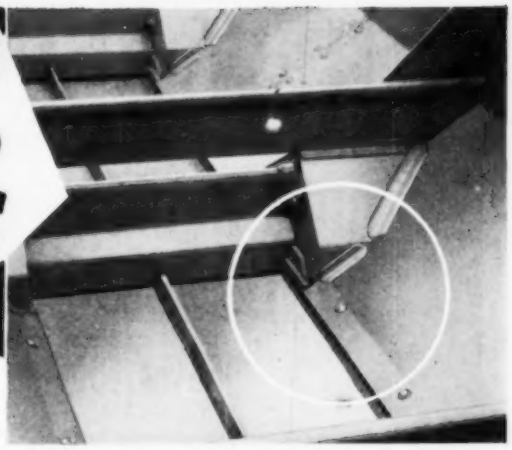
The "COMPLETELY SEALED" feature now being built into every S-D "Automatic" drop bottom car is money saving news to mine operators who have been looking forward to the day of dust-free tracks. Coal dust accumulation is expensive. Some mines have been spending over $10,000 annually on track clean-up alone. What is it costing you? The S-D "Sealed Automatic" completely eliminates this expense because it is dust sealed both at wheel hoods and at the necessary clearance space between the doors and the frame. The coal dust can't dribble out and accumulate on the track . . . it stays in the car until it is dumped in the bin with the coal. This patented Sanford-Day feature is another step in maintaining Sanford-Day leadership in saving money for mine operators. You still get the same big capacity and automatic unloading. You get our improved long-life construction and our foolproof "Jerk-Out" unlatching device, that operates beneath the car. Now, with this revolutionary "COMPLETELY SEALED" construction . . . you get the greatest money saving car the industry has ever known.

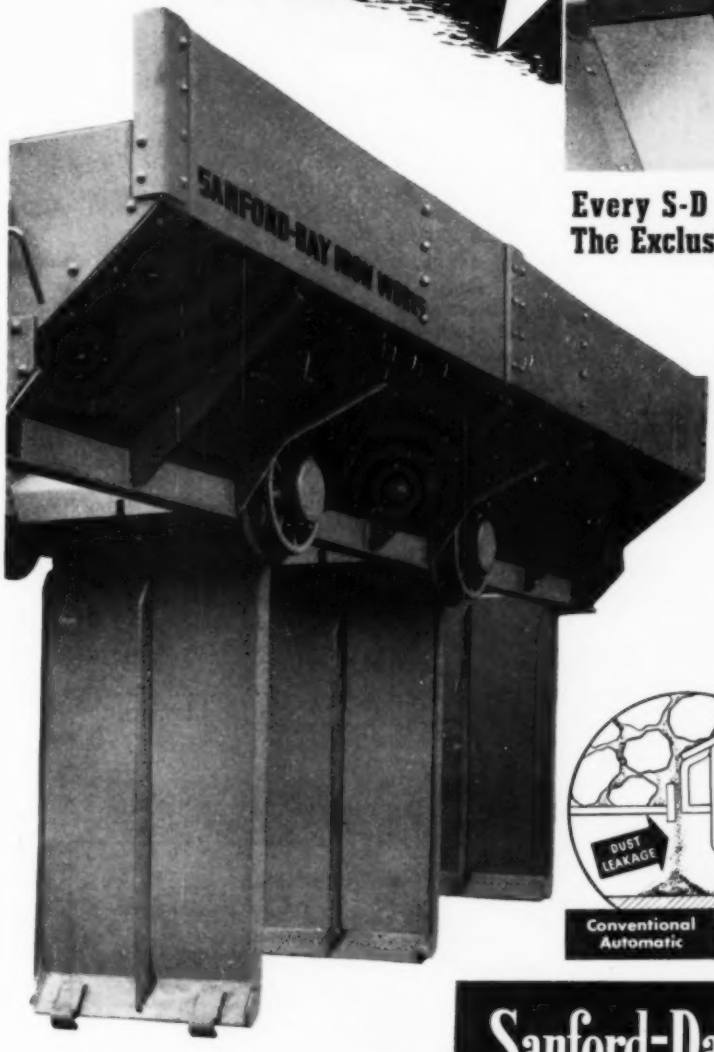
The S-D "Automatic", shown above and below, has our foolproof "Jerk-Out" unlatching device that operates underneath the car. It has two latch hooks for safe and foolproof operation, and all unlatching mechanism on end of car is eliminated.

No other car can offer you the advantages of S-D "Automatics" for efficient service, maximum production and low cost per ton of coal handled.

Did you know that, whatever your method of mining, it isn't new or peculiar to our "Automatics"? Regardless of the type of mine, there are S-D "Automatics" working under the same conditions elsewhere, and our company can show you these installations. So, if you have a special problem . . . if you're looking for greater efficiency, write today, we'll be glad to furnish complete details on the S-D "Completely Sealed Automatic," and how they are used in mines similar to yours. Seeing is believing, just contact us.

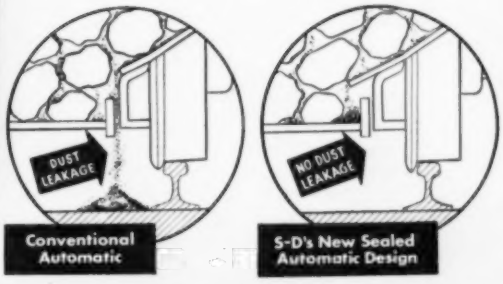
..When You're "Sealed" HERE





Every S-D "Sealed Automatic" Has The Exclusive DUST-ROOF SEAL . . .

The "Dust-Roof" seal consists mainly of a car sill construction that permits extension of the sides into the car to form a "Dust-Roof" over the necessary clearance space between the drop bottom door and the car frame. This "Dust-Roof" extension carries the dust across the clearance space and deposits it in drop bottom door. (As illustrated in the photo above and the cross-section drawing below at right). Without this "Dust-Roof," the dust follows the side down until it reaches the clearance space where it dribbles through and accumulates on the tracks (as illustrated in the cross-section drawing below at left.) To make this sealed-car 100% effective, even the wheel hoods are dust sealed. With the S-D "Completely Sealed Automatic," the dust is sealed-in until the doors are tripped at the bin. The expense of track clean-up is eliminated.



Sanford-Day Iron Works
KNOXVILLE TENNESSEE

NEW BELT CONVEYOR

cuts haulage cost 50¢ per ton with 25% lower investment

Saves 6000 feet of Coal Travel

In 1931 operations in a once thriving mine came to a standstill because of high costs.

A few years ago increasing demand for coal brought the management of the mine to the conclusion that it could be opened and operated economically if a new plan for conveying the coal could be put into execution.

A three-way engineering team went into action—operating engineers, consulting and equipment engineers, and conveyor belt engineers from U. S. Rubber.

Their bold plan called for the longest single unit coal slope belt conveyor in the world—2600 feet long, 15 degree incline, 643 foot lift.

Just at this time U. S. Rubber completed development of an amazing new conveyor belt combining super-strong Ustex* and flexible nylon. This timely development made it practical to handle the entire conveying job from underground loading points to the surface with a single Ustex-Nylon belt. This, together with a ¼-mile surface belt conveyor provided a practical short-cut to economy and success.

For now the mine is operating. Coal is moving up the slope, across the surface on an efficient belt conveyor system—modern, streamlined, economical—another achievement of Three-Way Engineering.

SUMMARY OF SAVINGS
New Belt Conveyor System

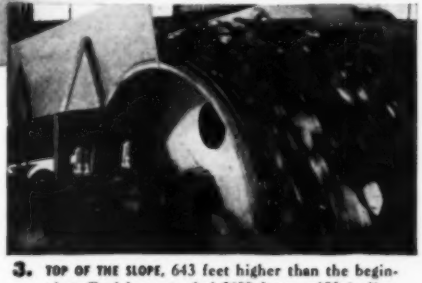
ELIMINATES:	One vertical shaft One underground slope One underground plane Six transportation units (rail, hoist) Topping spillage on rail system
PREVENTS:	Transportation accidents
REDUCES:	Lost man-hours. Insurance rates
INCREASES:	Tons per hour; tons per man
CUTS:	25% from investment 50¢ per ton from haulage costs 6000 feet from coal travel

SYSTEM...

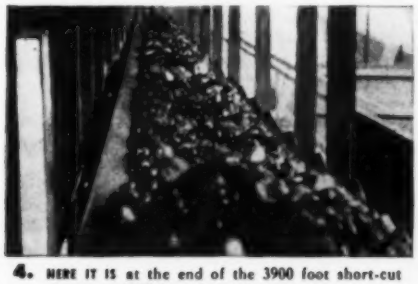
World's Longest Single-Unit Coal Slope Belt Conveyor—equipped with more than a mile of U.S. Rubber USTEX-NYLON BELT—delivers coal in continuous stream to a ¼-mile surface conveyor also equipped with a U.S. Rubber Belt.

1. COAL STARTS ½-mile upward trip from the underground hopper on single unit conveyor equipped with one mile of Ustex-Nylon belt.

2. UP IT RIDES . . . on U. S. Rubber's amazing Ustex-Nylon Belt. Ustex for strength, Nylon for flexibility.



3. TOP OF THE SLOPE, 643 feet higher than the beginning. Coal has traveled 2600 feet on 15° incline, now transfers to ¼-mile overland belt also made by U. S. Rubber.



4. HERE IT IS at the end of the 3900 foot short-cut that saves 6000 feet of travel.

When you have a materials handling problem—underground, slope, or surface, call in a U. S. Rubber engineer. Write Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, New York.

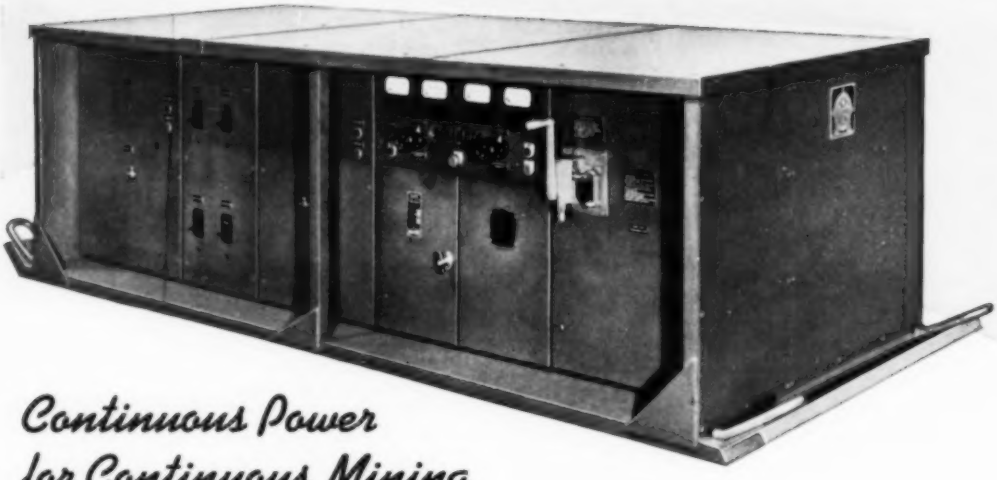
*Registered trade name of U. S. Rubber

A DEVELOPMENT OF

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES
RUBBER COMPANY

Now... Another Reliance First!



Continuous Power for Continuous Mining

- TWO packaged sections . . . install unit interconnectors, connect to A-c. source and D-c. power is immediately available. No tune up time.
- 300 Kw. and smaller sets in overall height of 42" or less.
- Lower first cost . . . lower operating costs. Minimum service required—normal visual inspection and lubrication—no costly parts to be replaced periodically.
- 80% leading power factor saves money normally lost in use of other coal mine power centers.
- Variations of A-c. voltage input not reflected in D-c. output, resulting in desired voltage regulation.
- Rising voltage characteristics assure rated voltage at machine.
- Continuous power supply for *two* continuous miners and all necessary auxiliaries.
- *Sectionalized* D-c. distribution panel prevents an electrical fault in one machine or cable from interrupting production of the other units.
- Automatic restarting after power interruptions of up to one minute duration.
- Each section a complete assembly of drip-proof items.
- Rugged and portable, skid base makes realignment or grouting in of set unnecessary.
- Greatest flexibility . . . unit moved anywhere, everywhere the continuous miner goes—and in a *minimum* of time.
- Personnel safety emphasized—design based on AMERICAN MINING CONGRESS recommended standards for installations of electrical equipment underground.

This Reliance 300 Kw. Power Center provides power for two continuous miners and associated shuttle cars or conveyors.

RELIANCE *Portable* D-C. POWER CENTER

Spot Conversion by

RELIANCE

42" High, Two-Unit

PORTABLE D-C. POWER CENTER

THIS RELIANCE D-c. Power Center—consisting of only *two* packaged sections, the M-G set and the control package—has brought new flexibility to modern high-speed mining. This twin unit is rugged, fully protected, built on skids for fast relocation near the working face. The set has an 80% leading power factor synchronous motor. Excellent voltage regulation is maintained through 200% of rated load.

At the Coal Show in Cleveland, this Power Center provided much of the D-c. power used by the many machines on exhibit. Possibly you saw it in action! Portability of this unit was demonstrated when it was loaded at our plant, trucked to the auditorium, unloaded, skidded to its location, rolled into position and hooked up in less than four hours. Relocation on the job in *your* mine can be accomplished within this time.

Its low height and compactness allow it to be skidded into positions closer to the face. It is the perfect running mate for your latest and fastest equipment. Write today or call in a RELIANCE representative for information on amazingly short delivery and low price.

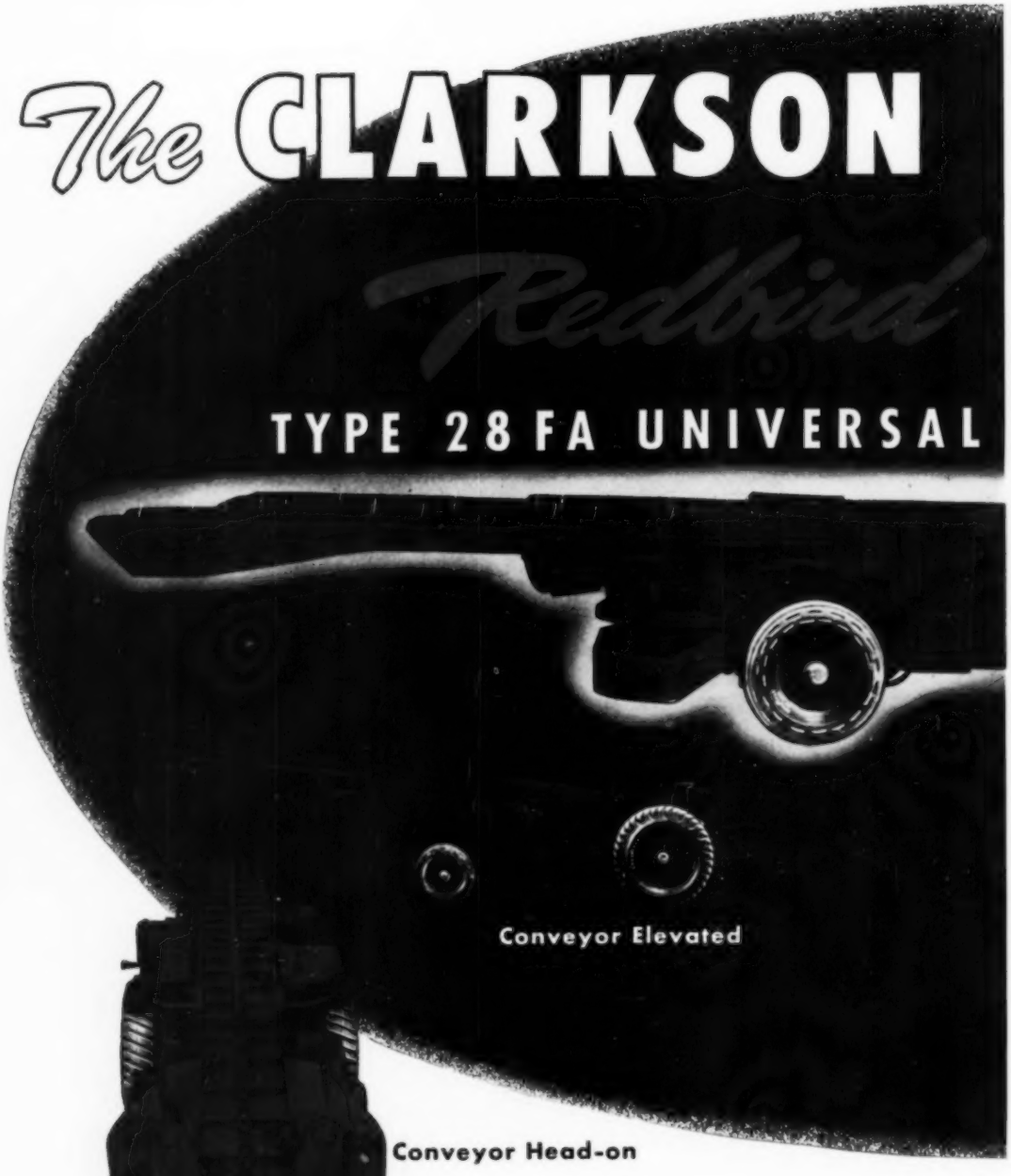
RELIANCE ELECTRIC AND ENGINEERING CO.

Sales Representatives in Principal Cities • 1055 Ivanhoe Road, Cleveland 10, Ohio

The CLARKSON

Redbird

TYPE 28FA UNIVERSAL



Conveyor Elevated

Conveyor Head-on

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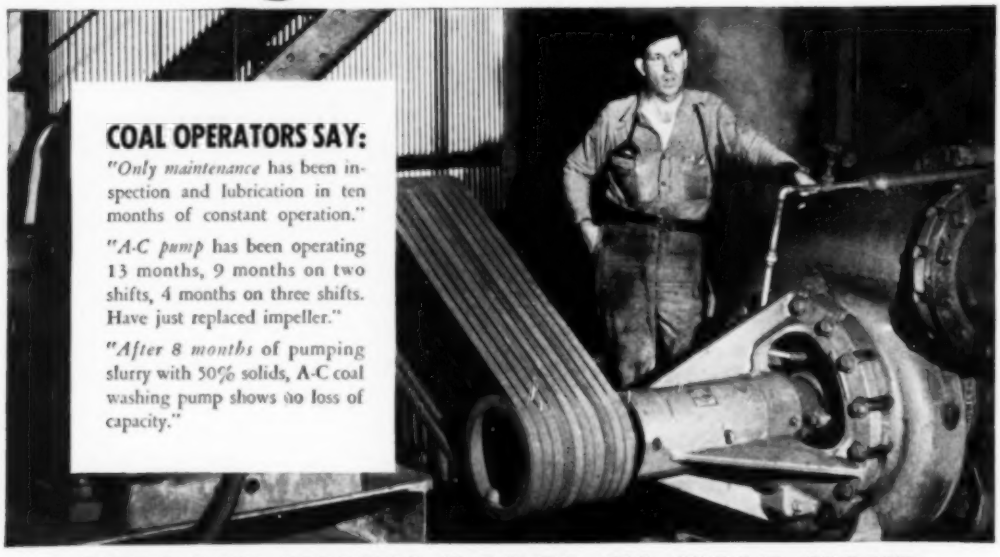
COAL WASHING PUMP EXPERIENCE PROVES

Long Parts Life!



COAL OPERATORS SAY:

"Only maintenance has been inspection and lubrication in ten months of constant operation."

"A-C pump has been operating 13 months, 9 months on two shifts, 4 months on three shifts. Have just replaced impeller."

"After 8 months of pumping slurry with 50% solids, A-C coal washing pump shows no loss of capacity."

REPLACE WORN PARTS IN HALF HOUR

YOU CAN GET the two things that coal operators want most in coal washing pumps from Allis-Chalmers solids-handling pumps. They give you longer life between servicings and they make it easy and economical to replace parts.

Allis-Chalmers coal washing pumps are designed with extra strong parts, built of *Allisite*, a special abrasion-resistant alloy, and application-engineered by experts with many years of experience in coal washing problems.

SAVES ON REPAIR TIME

When parts must be replaced, as they must in all types of coal washing pumps, the Allis-Chalmers coal washing pump will save you hours of labor, cut down-time to a minimum and lower repair costs.

This pump can be dismantled and reassembled in a half hour without disturbing piping. Parts with varying rates of wear are separated. Only those actually worn are replaced. Three sets of bearings, brackets and shafts cover all pump sizes, reducing parts inventory as much as 2/3.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

GET THE FACTS

Discuss your coal washing equipment problems with an Allis-Chalmers pump engineer. He can show you dollars and cents savings you can make. Contact your A-C Sales Office today. Or write for Bulletin 6381.

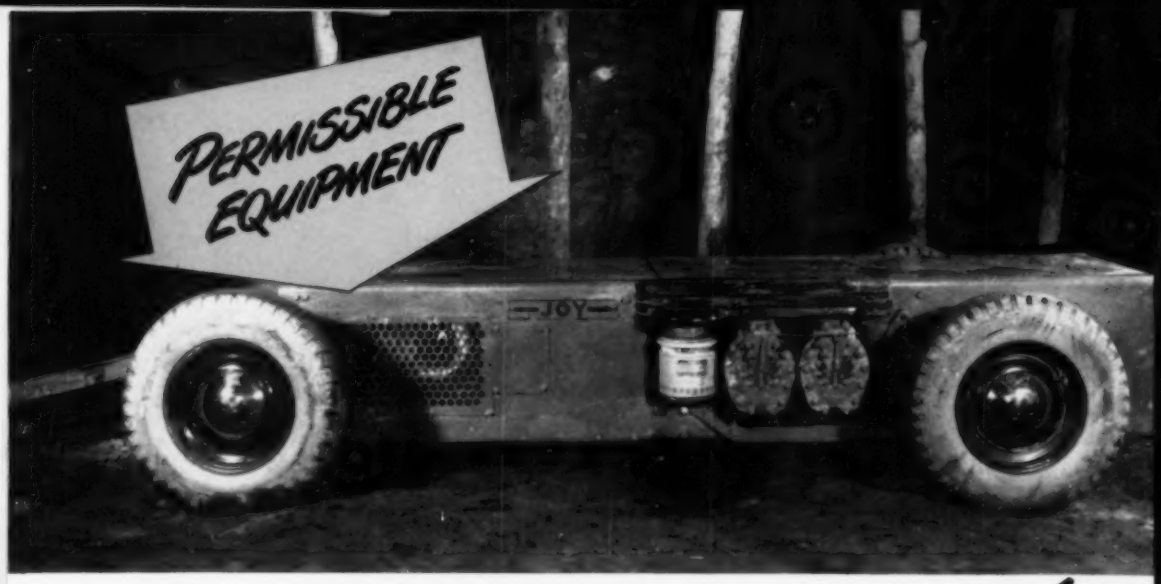
A-2761

ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace. Pump can be dismantled or assembled in a half hour without disturbing piping.

Allisite is an Allis-Chalmers trademark.

ALLIS-CHALMERS



ROOF-BOLTING TEAM!

JOY MINE-AIR COMPRESSORS and STOPERS

Check these Advantages!

★ JOY COMPRESSORS . . . B of M-approved, and less than 30" high. Rubber tire and track models, either self-propelled or draw-bar types. Two sizes: 130 or 175 CFM at 115 PSI. Compressors are two-stage, single acting, air-cooled—highly efficient and reliable.

★ JOY STOPERS . . . Complete line down to 21" high for roof-bolting applications. These stopers do the entire job: drill the hole, drive the bolt and wedge—and as an *exclusive* feature, have a built-in torque wrench for tightening the nut.

Consult a Joy Engineer

W&D CL 2581

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

JOY "JCM"

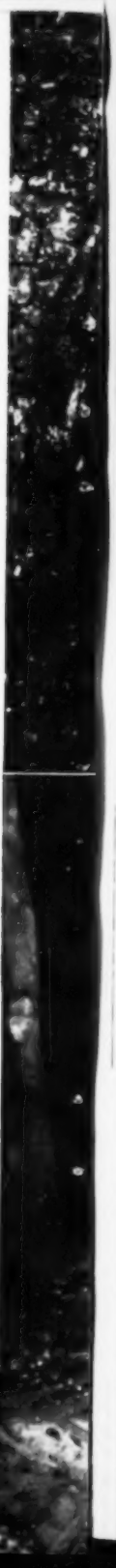
CONTINUOUS MINER

THE LAST WORD IN

HIGH-TONNAGE

LOW-COST

MECHANIZED MINING



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with JOY SULMET BITS

TUNGSTEN CARBIDE-TIPPED...
with proved ability to give you

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A new booklet gives you

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This NEW, FREE booklet by Airco gives you authentic, understandable information for combating wear — caused by abrasion, impact, heat and corrosion.

Here, you will get facts essential for increasing the service life of *new* parts, and restoring *worn* parts for additional service. In part, this definitive, profusely illustrated booklet gives you:

- A handy, easy-to-understand guide for selecting the proper alloy for the proper wear retarding job.
- A Hardness Conversion Table.
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☐ Send me a copy of Airco's New Hardfacing booklet — at NO cost to me.

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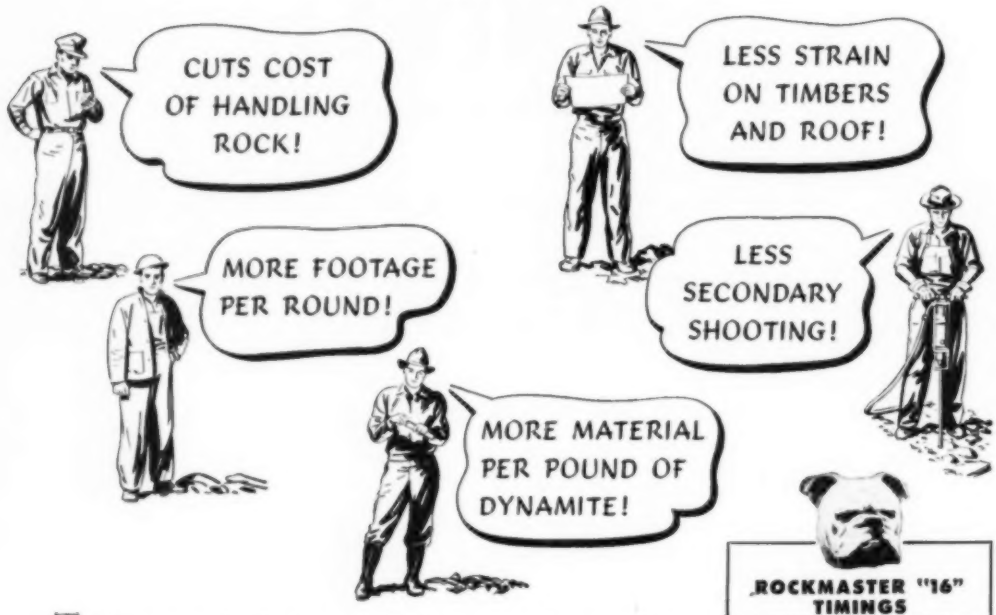
What Does the *NEW*
ROCKMASTER "16" Blasting System
Do for *YOU*?


CUTS COST OF HANDLING ROCK!
LESS STRAIN ON TIMBERS AND ROOF!
MORE FOOTAGE PER ROUND!
LESS SECONDARY SHOOTING!
MORE MATERIAL PER POUND OF DYNAMITE!

THE ROCKMASTER 16 blasting system is the greatest improvement in blasting methods since Atlas introduced ROCKMASTER—the first millisecond delay blasting system! Skilled blasting men have agreed on that point. They can now shoot multi-hole blasts with 17 *different* ROCKMASTER electric detonators, all firing in a fraction over one-half second! No complicated wiring. No complex machine to buy.

Naturally this means better control over breakage than was ever possible before . . . better control over throw, too . . . and over noise and vibration.

Underground, the new ROCKMASTER system provides sufficient delays for complex large rounds. The blaster gets all the advantages of ROCKMASTER's superior breakage control—*plus* greater safety because of less vibration—less dust—more footage per round.

Get the full story from your Atlas representative. Ask for new booklet explaining the *why*, *wherefore* and *how* of ROCKMASTER.

ROCKMASTER "16" TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

SMOOTH TRAVELING FOR MINE POWER

EVER THINK OF BOREHOLE AND SHAFT CABLES AS HIGHWAYS?

That's just what they are. They're the roads over which electric power must travel in order to reach the underground workings of mines. And with vital machinery depending on that power for the steady output that means high production, "back-road" cables must be ruled out.

That's why it's wise to remember Simplex-ANHYDREX Borehole and Shaft Cables. Their Anhydrex insulation is a special low water absorption compound that can't be beat for long life . . . and during that long life . . . for resistance to moisture and electrical leakage. Their neoprene jackets can be relied upon for balanced protection against abrasion, oil, heat, sunlight and flame.

Simplex-Anhydrex Borehole and Shaft Cables are free of heavy metallic sheaths; you save on cost and eliminate much of the labor usually needed for installation. They can be had in single or multi-conductor types, designed for whatever voltage is required. For full details contact the Simplex representative in your area or write us direct.

SIMPLEX-ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

Eyes are SAFE when protected by

AO 6000 Series Metal Goggles

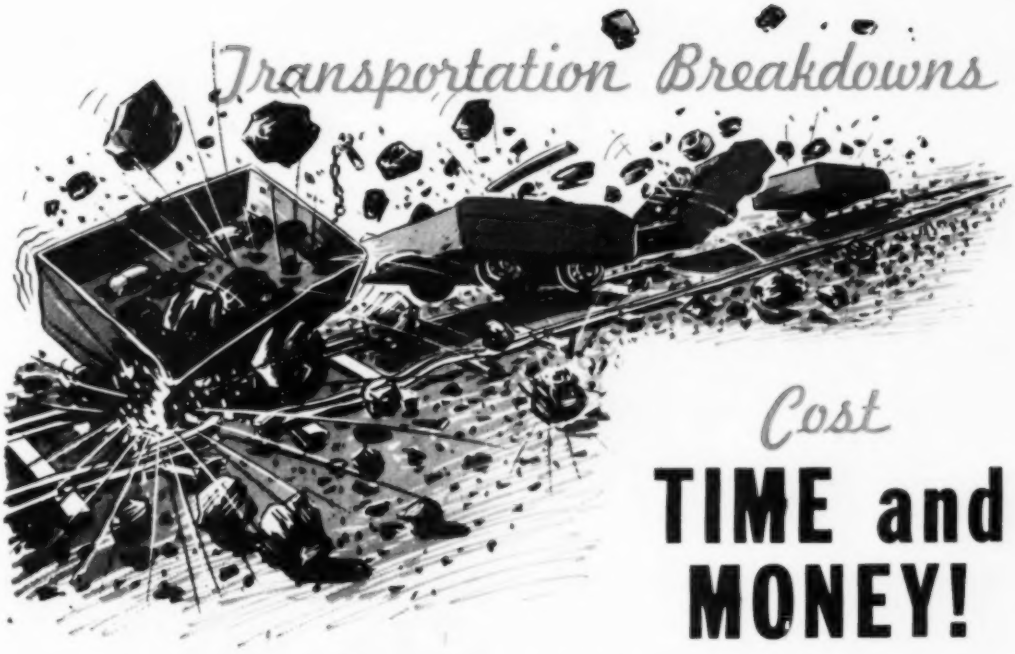
Here is a strong, comfortable metal spectacle goggle that provides assured protection against flying particles striking from the front —and, when equipped with side shields, against hazards from the sides.

Features include rigid saddle bridge construction with reinforcing bar; insulated perspiration-proof, heat-resistant temples. Side shields are easily cleaned, non-corroding and allow ample ventilation. Available with orbit shaped Super Armorplate or 6 Curve Super Armorplate clear or *Calobar lenses in medium, dark or extra dark shades. Your MSA Representative can supply you.

*Calobar lenses are recommended when protection is also needed against glare, heat, ultra-violet and infra-red radiations.

American Optical Company — Safety Products Division

Southbridge, Mass.
Branches in Principal Cities



Cost TIME and MONEY!

ONE BROKEN WHEEL CAN CAUSE UNTOLD EXPENSE AND DELAY

STERLING CAST STEEL WHEELS will eliminate delays—save time and labor without any additional expenditure. Let us present the facts! Save power by using STERLING balanced design wheels.

Representatives:

R. E. GERDETZ EQUIPMENT CO., Law & Commerce Bldg., Bluefield, West Virginia. H. P. HILLHOUSE, JR., 20 N. 21st St., Birmingham, Alabama. J. E. NIESER, 720 Roselawn Ave., Pittsburgh, Pennsylvania. SCHROEDER BROS. MINE EQUIPMENT & SUPPLIES, 810 Ridge Ave., Pittsburgh, Pennsylvania. WETZEL EQUIPMENT AGENCY, 375 Southwest Temple St., Salt Lake City, Utah. WILKES-BARRE EQUIPMENT CO., Miners' Bank Bldg., Wilkes-Barre, Pennsylvania.

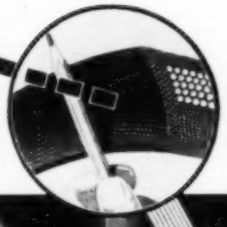
Write us your haulage problems. Our engineers are at your service.

This Simple Test
Shows Exactly How

The CONCAVE SIDE...

(U.S. Patent No. 1813698)

Saves You Money!



Pick up *any* V-belt having the ordinary straight sides and *bend* the belt. Three things will happen, right before your eyes.

(1) The top of the belt is under tension and grows *narrower*. (2) The body, under compression, becomes wider. (3) The sides of the belt *bulge out*. (Figures 1 and 1-A, below.)

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove

This bulging of the straight-sided V-belt in its sheave-groove costs you money in *two* ways—(1) The bulge causes uneven sidewall wear—*shorter life!* (2) The bulging side cannot evenly grip the wall of the sheave groove—a loss in *transmission efficiency!*

In figures 2 and 2-A, you see how the precisely engineered *concave* side of the Gates Vulco Rope exactly corrects this bulging.

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave-Groove.

Two distinct *savings* result. (1) The Gates Vulco Rope wears evenly—*longer life!* (2) The entire side-wall grips the pulley—carries heavier loads and *sudden load increases* without slippage:—saves *belts* and also *saves power!*

The Mark of SPECIALIZED Research

The Concave Side is *MORE IMPORTANT NOW* Than Ever Before

Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates *SPECIALIZED* Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

496

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U.S. and in Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

Rome 60

MINING CABLES

(NEOPRENE SHEATHED... MOLDED IN LEAD)

GROUNDED and FLAME PROTECTED

For Safety

PLUS

RESISTANCE TO ACIDULOUS MINE WATERS
RESISTANCE TO ABRASION
UNIFORM DIAMETERS
SUPERIOR QUALITY

Look for "Appro. No. 1058M" Molded in the Neoprene jacket—it is your assurance of approval under Federal and State of Pennsylvania Safety Codes.

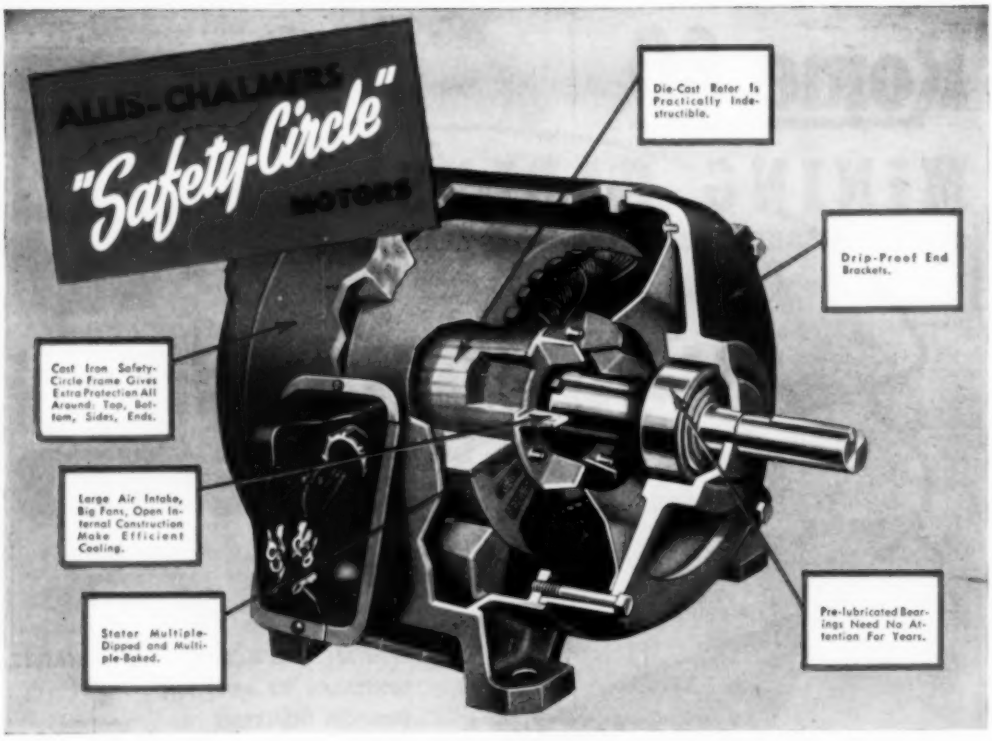
ROME 60 MINING CABLES ARE AVAILABLE AS:

Single Conductor Locomotive
Concentric (Two Conductor)
Parallel Duplex (Twin) With or Without Ground Wire
Multi-Conductor Power—Types W and G

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK


ALLIS-CHALMERS
"Safety-Circle"
MOTORS
Die-Cast Rotor Is Practically Indestructible.
Drip-Proof End Brackets.
Cast Iron Safety-Circle Frame Gives Extra Protection All Around: Top, Bottom, Sides, Ends.
Large Air Intake, Big Fans, Open Internal Construction Make Efficient Cooling.
Stator Multiple-Dipped and Multiple-Baked.
Pre-lubricated Bearings Need No Attention For Years.

HOW SAFETY-CIRCLE

Means Motor Dependability

EXTRA PROTECTION means extra dependability. That's why Allis-Chalmers protects the working parts of the motor with the exclusive SAFETY-CIRCLE. Compare this motor with motors of less rigid construction. The SAFETY-CIRCLE motor will not distort in mounting or under strain. And you get the extra protection of drip-proof end brackets at no premium.

EXTRA PROTECTION INSIDE, TOO

Stator is multiple-dipped and multiple-baked in special insulating varnish. Rotor is die-cast aluminum. Stator is mounted in four longitudinal ribs which leaves plenty of air space between stator and frame. Large fans cast integrally with the rotor and ample air intakes keep temperatures well within rated limits. *Ball bearings are factory-lubricated and require no further attention for years.*

When you shop for motors, remember SAFETY-CIRCLE gives you *extra protection, extra dependability* and *lower operating costs.*

For details on SAFETY-CIRCLE advantages, see your A-C Authorized Dealer or Sales Office or write for Bulletin 51B6210B. Sizes 1 to 20 hp, 326 frames and smaller. *Safety-Circle, Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS, 968A SO. 70 ST. MILWAUKEE, WIS. A-2691

ALLIS-CHALMERS

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

FOR LEAKPROOF, TROUBLE-FREE PIPE RUNS

Cut-a-way view of a Walseal Tee showing ring of silver brazed alloy, and completed Silbraz joint.

On all types of piping jobs where Type "B" copper or red brass pipe is used, trouble can be avoided by installing Silbraz* joints — made with Walseal valves, fittings and flanges.

Threadless, patented Silbraz joints are silver brazed (not soft soldered) pipe joints that are leakproof, trouble-free — permanent ... connections that will not creep or pull apart; that literally join with the piping system to form a "one-piece pipe line". Thus, these modern joints eliminate the need for maintenance and costly repairs — especially important where lowered operating costs are imperative.

For complete details on the modern Silbraz joint, made with Walseal products, write for a copy of Walworth Circular 8-4.

**Patented — Reg. U. S. Patent Office.*

Recommended for

- **Hot and Cold Water Circulating Systems**
- **Boiler Feed Lines**
- **Steam Return Lines**
- **Condensate Lines**
- **Low and High Pressure Air Systems**
- **Lubricating Oil Circulating Systems**
- **Industrial Gas Piping**
- **Solvent and Vacuum Piping Systems**

Make it a "one-piece pipe line" with WALSEAL

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

Here's What Operators Asked about HEAVY-MEDIA SEPARATION *at the Cleveland Coal Show*

Q. *Does Cyanamid build cleaning plants?*

A. No. Cyanamid does not build plants or manufacture equipment for them. You can design and build your own plant or contract for the design and construction of a Heavy-Media Separation plant through an engineering firm of your own choice. Several well-known firms have had considerable experience in the design and construction of complete plants and in Heavy-Media Separation units to supplement existing cleaning facilities.

Q. *If you don't build plants, what does Cyanamid do?*

A. Cyanamid acts solely as Technical and Sales Representative for Heavy-Media Separation Processes. We maintain extensive laboratory and testing facilities at the Cyanamid Mineral Dressing Laboratory at Stamford, Conn. where we can run continuous tests on your coal. We offer sound, unprejudiced counsel on what Heavy-Media Separation can do on your coal, based on these tests and on our many years of world-wide experience in the application of the process to coal and metallic and non-metallic ores. We work with your engineers on plant design and provide the assistance of Cyanamid Field Engineers in tuning-up the installation.

Q. *Why do you believe Heavy-Media Separation is the best cleaning method?*

A. Actual plant tests. Heavy-Media Separation is the only process that closely duplicates "heavy liquid" results over a wide size range at any pre-determined gravity from 1.25 to 3.75. What's more, it is the only process that provides automatic, continuous and complete removal of large and variable amounts of refuse without volumetric limitation.

Q. *That's claiming a lot. How do you know it's so?*

A. Again, actual plant operation. You set the gravity of the Heavy-Media pool to the gravity you need to get the quality coal you want. From then on, the Heavy-Media Separation unit maintains that gravity continuously within ± 0.01. Rejection of refuse is as certain as the force of gravity. Heavy refuse sinks, good coal floats.

If you wish, an automatic density control and density recorder can be provided to give you visual evidence of uniform performance.

Q. *Yes, but isn't Heavy-Media Separation a relatively new and untried process?*

A. In the metallic mining industry, Heavy-Media Separation has been in continuous commercial use for years. For coal cleaning, it has been used over three years. Twelve Heavy-Media Separation coal preparation units are operating satisfactorily; nine more are now being designed and constructed.

Q. *Since we went to full-seam mechanized mining we send up everything we knock down. Can your process handle large amounts of refuse with sudden changes in the quality of the raw coal?*

A. That's one of the big features of Heavy-Media Separation. Regardless of how the raw feed varies, it can handle the same tonnage and make the same quality. You never have to cut back your feed to let the cleaning units catch up with a sudden fluctuation in the refuse content of your raw coal.

Q. *Supposing our shipping specifications change, how do you change the gravity?*

A. By increasing or decreasing the relative proportion of magnetite and water in the Heavy-Media separating pool, the gravity can be quickly and easily adjusted to treat coal at any gravity you want.

Q. *Does Cyanamid supply Magnetite?*

A. No. Magnetite is a highly magnetic, common iron mineral which is finely-ground for Heavy-Media use. It's readily available in the proper grades as a low-cost commodity. Cyanamid has no self-interest in its production or sale.

Q. *How much Magnetite is lost per ton of coal cleaned?*

A. There's no exact answer possible. Let's put it this way. The magnetite medium is washed off the coal and the refuse recovered by the magnetic separators and continuously fed back to the separating vessel. Some does get lost. It varies with the feed and the plant. Plants are operating with make-up as low as $\frac{1}{4}$ pound per ton of feed handled. Preparation engineers estimate loss of less than $\frac{1}{2}$ pound of medium per ton of feed as a reasonable expectancy on any well designed and well operated unit. The cost of "make-up" medium is not an important factor.

Q. *I notice some plants have "Cones" and others "Drums". Which is better?*

A. It depends largely on the character of the feed. It's an engineering-design question which your engineers can best answer. Remember, however, *Heavy-Media Separation is a process* based on separation by gravity difference. It works efficiently and economically, independent of the shape of the vessel in which the separation takes place.

Q. *Which is better – a "Package Plant" or a "Custom Built Plant"?*

A. Again, it all depends. Preparation plant engineering firms offer both. There are quite a few "package plants" doing a fine job on operations cleaning 100 tons-an-hour or less. On the other hand, the largest bituminous cleaning plant ever built naturally has "custom built" Heavy-Media Separation units as essential components. Preparation engineers can best decide which is best for you!

Q. *Our cleaners are practically as good as new. They may not recover all the good coal, but we can't afford to junk them. Don't a lot of operators tell you that?*

A. Yes. But a lot of operators with fairly modern plants are considering Heavy-Media Separation to supplement their present washers. A number of present Heavy-Media Separation units were installed as auxiliary units to improve quality, cut bank loss and increase capacity at low capital cost.

Q. *I've been watching that scale-model working. Does the coal separate from the refuse that fast in a full-size plant?*

A. Yes, indeed. On full-size plants, marked pieces of coal and slate show up on the respective screens in 6 to 10 seconds after entering the Heavy-Media Separation vessel. That's one reason why clay contamination or slimy-refuse isn't a problem with a Heavy-Media Separation unit.

Q. *Do you have any printed material on Heavy-Media Separation?*

A. Yes. We'll be happy to send you *Mineral Dressing Notes #16 – "Coal Preparation"* which has 38 pages of interesting data and test results on both Heavy-Media Separation and the Dutch State Mines Cyclone Separator Processes.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

WALTER ...the only truck providing...

100% TRACTION IN FOUR DRIVING WHEELS!

300 hp. Walter Tractor Truck, with 30 ton bottom dump trailer.

- ★ Gets more Haulpower out of every horsepower
- ★ Eliminates spinning wheels and stalled loads on soft or slippery surfaces and steep grades
- ★ Hauls 20-30-40 ton payloads in any weather, any season, on or off the road
- ★ Reduces damage to roads; gives 50 to 100% longer service from tires.

WALTER Tractor Trucks give you not merely two, but *four* driving wheels—and not merely a four wheel drive, but the famous Walter 4-Point Positive Drive.

In this unique system, three automatic locking differentials concentrate power on the wheels having most traction at any instant. Result —constantly available tractive power under all running conditions; never slipping, spinning wheels to waste power, stall loads, rip roads or wear tires.

With this 100% unfailing traction, Walter Tractor Trucks enable you to haul huge payloads in weather or running conditions that stop other trucks. You can also use them for overburden removal, off-season stockpiling, winter operation. They not only haul more tons per day, but they work more days during the year.

Profit from the high tonnage and high availability of Walter Tractor Trucks at your mine. Write for literature giving full details on the construction and advantages of Walter Tractor Trucks.

WALTER
4-POINT POSITIVE DRIVE
TRACTOR TRUCKS

200 hp. Walter Tractor Truck, with 20 ton back dump body.

WALTER MOTOR TRUCK COMPANY
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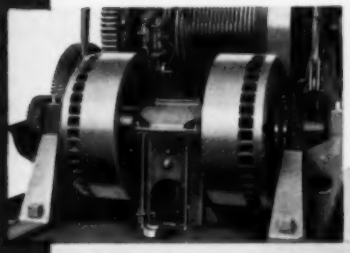
HOW MUCH will "Magnetorque" swing save YOU?

P&H

THE P&H MAGNETORQUE replaces the old frictions for swing and propel motions—transmits power electro-magnetically. It's smoother, more dependable, thoroughly proved.

*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.



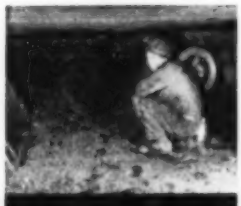
Bit Changing Reduced to 1/284

AT CLYMER NO. 2, CLEARFIELD BITUMINOUS COAL CORP.

J. H. Simpson, superintendent, says, "We have used Kennametal Bits for three years and they have saved us 284 bit changes per set. We like that because this seam formerly required either a complete new set of bits or a complete setting of bits every cut. Kennametal cuts 284 places before they are changed. That's good enough to convince us that there's no better bit for cutting coal."

Because cutting conditions are severe and because mine officials are among the most progressive in the business (they have never been stopped because of unsafe mining conditions in their 13-year history) they were among the first to equip with Kennametal. Today they say, "We will never use anything else."

The summary below shows how much more cutting time there is available per shift, how production can be increased, and how cutting can be done more efficiently. Be sure to consider possible savings, production increases like these before you buy, try, or specify any other bit. Mining Division, Kennametal Inc., Latrobe, Pa.



TOP CUTTING

Goodman 712 top cutter equipped with 33 U-7's cuts 284 places 25 feet wide before bits are replaced.

Summary of Savings made with Kennametal U-7 Bits according to J. H. Simpson, Mine Supt.

Tonnage per set of bits—6532.
Bit cost per set—
33 x $1.15 = $37.95.
Bit cost per ton—
$37.95 ÷ 6532 = .58 of 1¢ /T.
No. of places cut before bits are changed:
Conventional 1
Kennametal 284
Time saved on Bit Changing — 99.6%
Increase in cutting speed—50%
Less time lost in bit changing —shank-shoulder sets the gage, prevents the bit from sticking or wedging in the block.

KENNAMETAL Inc., Latrobe, Pa.

Please send me a free copy of Booklet on cutting

NAME_____

POSITION_____

COMPANY_____

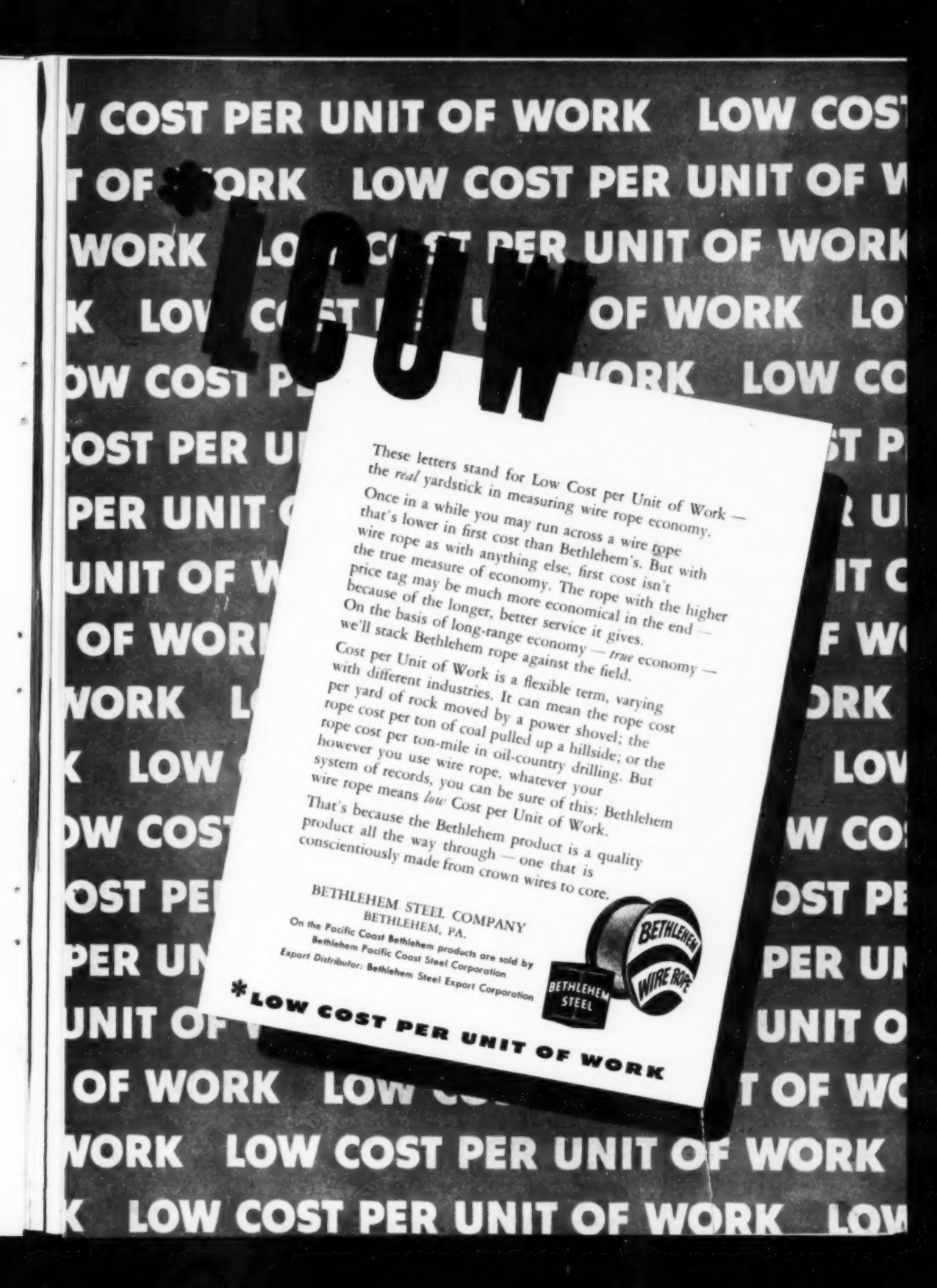
ADDRESS_____

Also send information on
ROCK BITS ☐ STRIP BITS ☐ DRILL BITS ☐

KENNAMETAL

Trade Mark, Reg. U. S. Pat. Off.

DRILL BITS • MACHINE BITS • STRIP BITS • ROCK BITS

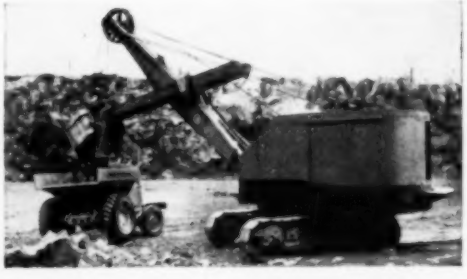

LOW COST PER UNIT OF WORK
*LOW COST PER UNIT OF WORK
These letters stand for Low Cost per Unit of Work — the *real* yardstick in measuring wire rope economy.
Once in a while you may run across a wire rope that's lower in first cost than Bethlehem's. But with wire rope as with anything else, first cost isn't the true measure of economy. The rope with the higher price tag may be much more economical in the end — because of the longer, better service it gives.
On the basis of long-range economy — *true* economy — we'll stack Bethlehem rope against the field.
Cost per Unit of Work is a flexible term, varying with different industries. It can mean the rope cost per yard of rock moved by a power shovel; the rope cost per ton of coal pulled up a hillside; or the rope cost per ton-mile in oil-country drilling. But however you use wire rope, whatever your system of records, you can be sure of this: Bethlehem wire rope means *low* Cost per Unit of Work.
That's because the Bethlehem product is a quality product all the way through — one that is conscientiously made from crown wires to core.
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation
BETHLEHEM STEEL
BETHLEHEM WIRE ROPE
*LOW COST PER UNIT OF WORK

HEAVY-DUTY

KOEHRING HEAVY DUTY

KOEHRING HEAVY-DUTY SHOVELS CAN CUT YOUR EXCAVATING COSTS

Here is a profitable way to cut your stripping and materials handling costs all around. Match high-speed Dumptor-hauling with dependable, heavy-duty Koehring excavators. It's a big production team, built to work together. Dumptor's heavy-duty construction, easy-loading design, fast hauling and dumping, match Koehring excavator's rugged digging ability and fast-operating speeds . . . give you matched speed and strength to keep output high, costs low. For complete facts on the big 1½-yard 605 (illustrated) . . . ¾-yard 304, or ½-yard 205 excavators, see your Koehring distributor . . . or write for bulletin.



for *heavy hauling...*

DUMPTOR BODIES BUILT FOR HEAVY ROCK SERVICE

To meet the toughest hauling conditions of mine, quarry and construction service, Koehring Dumptors have a ton of strength for every ton of payload. Heavy-duty bodies stand up under the severest shocks of loading rock from big mine and quarry shovels. All-welded sides, ends and bottom are heavily ribbed with 4" channels. High-carbon steel gives extra strength at stress points where abrasive rock action is most severe. Three-layer bottom of seasoned 1-5/8" oak between two 5/16" steel plates cushions shocks.

HEAVY-DUTY CHASSIS TAKES ROUGH HAUL ROAD SHOCKS

Rugged, 8" ship-channel main frame... 4" chrome steel drive axles . . . and cast alloy-steel "I" beam steering axle, add extra strength to Dumptor chassis. Big tires absorb road shocks. There are no leaf springs . . . only one big-double-coil spring on oscillating steering axle. That means no spring shackles to lubricate . . . no spring maintenance. And . . . you have 6 HP for every ton of gross vehicle weight for faster acceleration, less shifting, more grade-ability. Dumptors climb grades up to 24% with full load.

NO BODY HOIST MAINTENANCE WITH GRAVITY DUMP

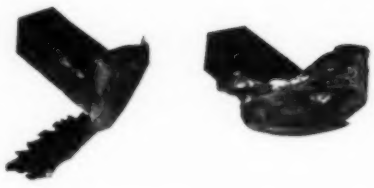
You don't lose time or spend money on body-hoist maintenance because Dumptors have no troublesome body hoists. Gravity dumps the full 6-yard load in one second. Free swinging, kick-out pan breaks suction, keeps dumping fast even in stickiest materials . . . adds an extra 3/16" steel to Dumptor bottom. Heavy-duty construction like this is your assurance that Koehring Dumptors will profitably stand up to your heaviest off-the-highway hauling assignments. Let your nearest Koehring distributor show you how.

KOEHRING COMPANY, Milwaukee 10, Wisconsin

Subsidiaries: PARSONS • JOHNSON • KWIK-MIX

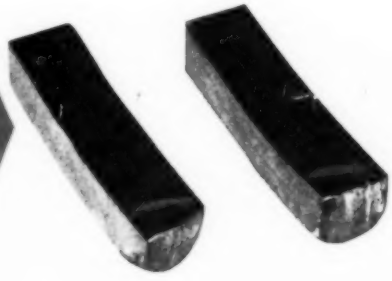
Dumptor—Trademark Reg. U.S. Pat. Off. x809

How to improve Blast Hole Drilling Bits



UNPROTECTED BLAST HOLE BIT

What happens to unprotected drilling bits in tough going is illustrated here. Heat, pressure and abrasion with no coolant has mushroomed bit ends beyond use. Result? Slow drilling, high footage costs.



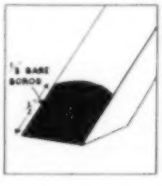
PROTECTED WITH STOODY HARD-FACING

Contrast the above bits with these. Stoody Borod on bit ends has resisted wear, overcome mushrooming. Bits are self-sharpening, retain efficient, serrated teeth that produce more hole, faster, for a lot less cost!

STOODY HARD-FACING
keeps them sharp, speeds drilling, cuts costs!

APPLICATION:

Hard-face leading face of bit ½" back from point with ⅛" bare Borod. Use excess acetylene flame. Where frictional heat is a factor, add small deposit of Stoodite on heel of bit.

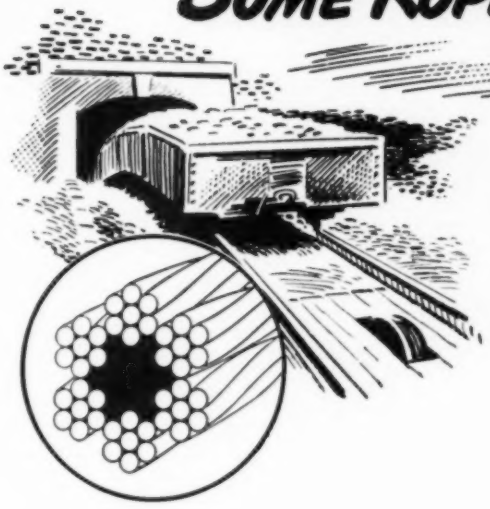


Wherever wear cuts equipment life and causes frequent replacements, you'll find good use for STOODY ALLOYS. Ask your Stoody dealer for help. He will be glad to lend a hand. *Stoody literature is available illustrating money-saving coal equipment applications.*

STOODY COMPANY

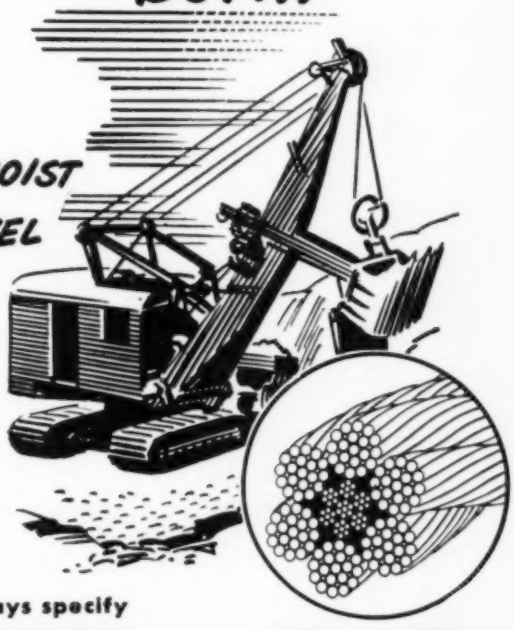
11943 EAST SLAUSON AVE.,
WHITTIER, CALIFORNIA

SOME ROPES FOOL YOU



U-W 6x7 WIRE ROPE IS GOOD FOR SLOPE HAULAGES BECAUSE IT IS COARSE AND RESISTS ABRASION —

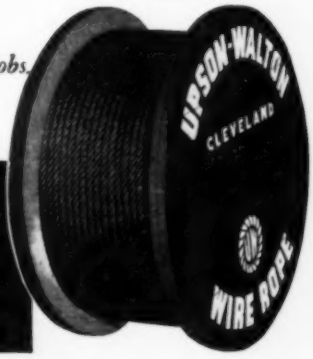
BUT...



FOR BOOM FALLS AND HOIST ROPES ON A POWER SHOVEL IT'S TOO STIFF. HERE WE RECOMMEND USING U-W 6x19 FILLER WIRE CABLE WHICH IS MUCH MORE FLEXIBLE

For longest and best service, always specify
U-W LAYRITE (*Preformed*) IMPROVED PLOW STEEL

We invite you to let UPSON-WALTON engineer your tough rope jobs.



Copyright 1948—The Upson-Walton Company

THE UPSON-WALTON COMPANY
Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth
Main Offices and Factory: Cleveland 13, Ohio

114 Broad Street, New York 4
3525 West Grand Ave., Chicago 51
241 Oliver Building, Pittsburgh 22

FASTER, CLEANER DRILLING *with less* "FLIGHT DRAG"

COALMASTER SPIR-L-WELD AUGER

The smoothness of the flight surface *reduces resistance* in conveying borings from the drill head—and minimizes clogging. This smoothness, combined with the concavity of the Coalmaster flight surface, forces cuttings away from the flight-edge and reduces drag to a minimum. The result is *faster, cleaner drilling* with *decreased power demand* and *less strain.*

Only Coalmaster Augers offer the smoothness of conveying surface achieved by the exclusive Coalmaster Spir-L-Weld process.

DRILLING COALMASTER TOOLS

Order from your nearest Coalmaster distributor

- Austin Powder Company, Cleveland, Ohio
- The Buda Company, Harvey, Illinois
- Diamond Supply Company, Inc., Evansville, Indiana
- Dooley Brothers, Peoria, Illinois
- Illinois Powder Mfg. Co., St. Louis, Missouri; Denver, Colorado; Salt Lake City, Utah
- Joy Manufacturing Company, Main Office: Pittsburgh, Pa. Subsidiaries and Representatives in 57 countries.
- Salem Tool Company, Salem, Ohio

***Coalmaster Special Alloy Steel Bits,* are heat treated for high strength wear and abrasion resistance. They are scientifically shaped and machined for faster, better cutting. Especially designed for exactness in drilling all bore hole sizes for underground and strip operations.**

***Coalmaster Hexanspeed Assembly,* above right, is a fool-proof, automatic coupling that speeds up auger changing—and increases productive time at the bore hole.**

CENTRAL MINE EQUIPMENT COMPANY

ST. LOUIS 15, MO.

Cut Down on Your Operating Costs—*Demand*

EATON 2-Speed Truck AXLES

To cost-conscious truck operators, Eaton 2-Speed Axles mean faster trips, reduced vehicle operating and maintenance expenses. These advantages are possible because Eaton 2-Speed Axles double the conventional number of gear ratios, thus enabling drivers to use the RIGHT ratio for every operating condition—starting out under full load, climbing grades, high-balling, quick shifting in traffic. As a result, vital truck parts are not overstressed, engines are permitted to run at efficient speeds, cutting gas and oil consumption and minimizing engine wear. Long life for the axle is assured by rugged construction and exclusive Eaton features. Ask your truck dealer to prove that Eaton Axles *more than pay for themselves.*

More Than a Million Eaton 2-Speed Axles in Trucks Today

Axle Division

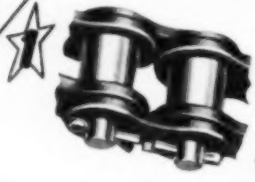
EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

EATON PRODUCTS: SODIUM COOLED POPPET AND PISTON VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGNUTS • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

4 STAR FEATURES OF Whitney UNIVERSAL MINING CHAIN

THAT KEEP TONNAGE UP . . .
MAINTENANCE DOWN



Link Parts — plates, pins, bushings and rolls — are precision made from heat-treated alloy steel stock assuring long operating life with minimum maintenance.

Universal Joints are constructed of steel forgings for toughness and workability. They are accurately machined for long life.

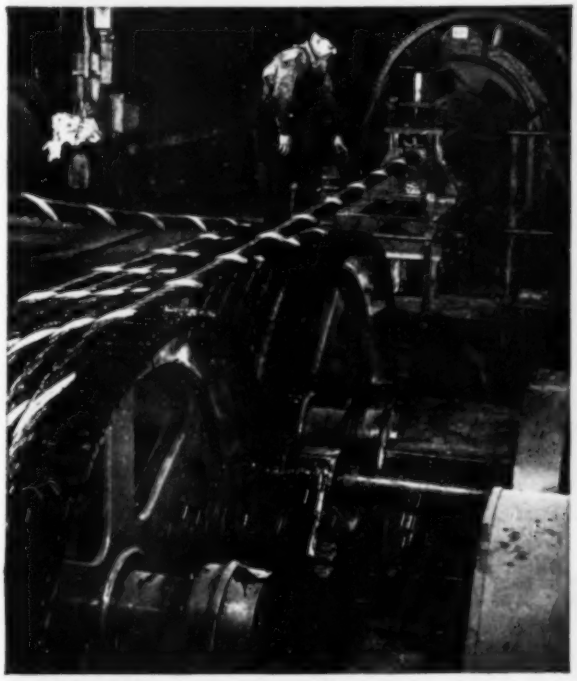
End Pins of the universal joints are fully riveted into deep countersink in the forgings, providing maximum anchorage under all operating conditions.

Flight Studs of alloy steel are fully machined and have milled threads. They are heat-treated for extreme toughness and durability.

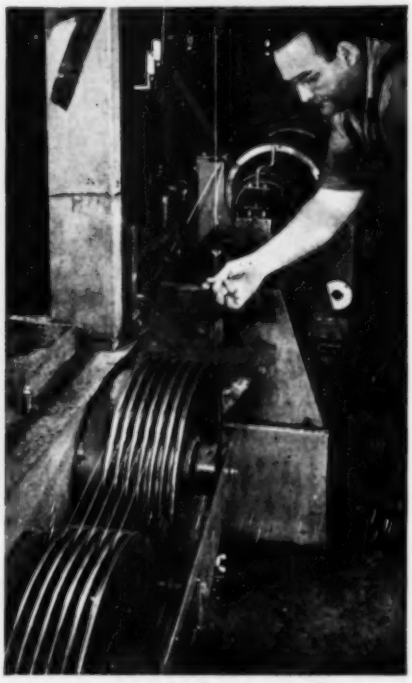
Get the tonnage producing, cost-cutting advantages of WHITNEY UNIVERSAL MINING CHAIN . . . specify and use this outstanding chain in your loaders. Investigate, too, Whitney Power Transmission Chain, Conveyor Chain and Cut Tooth Sprockets. Write for catalog and information.

Whitney CHAIN & MFG. CO.
Division of Whitney-Hanson Industries Inc.
210 HAMILTON STREET, HARTFORD 2, CONNECTICUT

This photograph shows a 3⅛" diameter Monarch Whyte Strand Wire Rope coming off a Macwhyte closing machine. Weight of this rope is approximately 16.65 pounds per foot. It has a strength of approximately 392 tons and is used for the digging line on large dragline excavator with 35 cu. yd. bucket.



In this photograph is a 3/64" diameter Stainless Steel Cord coming off a Macwhyte closing machine. It weighs approximately 0.35 lbs. per 100 feet; has a strength of approximately 270 pounds, and is used for many small cord needs.



Whether you need

LARGE WIRE ROPE or SMALL WIRE CORD

make your selection from

You will get smoother operation and better service when you use the wire rope designed and manufactured to meet your requirements.

Macwhyte engineers are always glad to suggest the correct Macwhyte rope or cord best suited to your needs.

Just drop a card or letter to Macwhyte Company or your Macwhyte distributor.

a thousand and one
WIRE ROPES
made by
MACWHYTE

MACWHYTE COMPANY

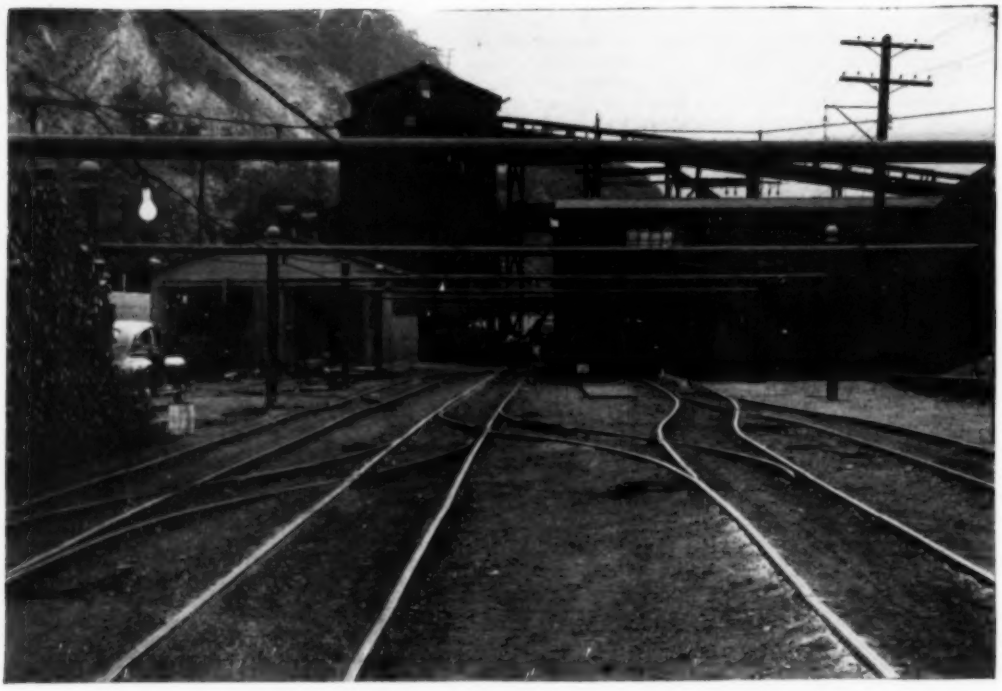
2931 Fourteenth Avenue **Kenosha, Wisconsin**

Manufacturers of Monarch Whyte Strand PREformed, Internally Lubricated Wire Rope, Atlas Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope.

Mill Depots: New York • Pittsburgh • Chicago
Minneapolis • Fort Worth • Portland • Seattle
San Francisco • Los Angeles

Catalog on request.

964



PLANNING NEW TRACK?

Let Bethlehem handle the troublesome details

Please be explicit, you say. What are the "troublesome details"?

Well, for one thing, figuring the layout. Getting it all systematized in advance so that every last item checks with your actual needs. Our engineers will help you plan such a layout. They know track, and they know mining.

What else? Many mines feel it's important to have Bethlehem cut the rails, curve them to proper radii, drill all holes, etc. Frequently this avoids wasted rail and saves time and headaches at point of installation. We usually recommend that all shop work be left in our hands, for then the layout comes to you ready for quick, easy assembly.

Bethlehem track can be furnished with the switch stands, guard rails, braces, and other accessories that best meet your traffic conditions. The cost is surprisingly moderate, and this you will welcome, of course. But the real beauty of such a system is the way it speeds up installation and haulage, reduces maintenance expense, and contributes to the efficiency of your operations.

Why not let us tell you the whole story? Say when, and a Bethlehem engineer will be glad to call.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Underground, in room track and secondary haulageways, Bethlehem steel ties have many advantages. They are easy to install and remove, and can be used over and over again.

★ BETHLEHEM STEEL ★

COULD THIS HAPPEN IN YOUR MINE?

JIM and TIM . . . the Mining GRIM—lins

Copyright—MINES EQUIPMENT

LOOK TIM ANOTHER CHANCE
TO MAKE A MINER YELL AND DANCE
HO HUM
A GOOD GROUND-LEAK SHOULD DO THE TRICK
THIS VOLTAGE IS SURE TO MAKE HIM SICK
EEYOW
GUESS WE WERE TOO ROUGH FOR HIM
THE NEXT ONES YOURS TO TORTURE, JIM
THE LONG SLEEP

A MINES PLANNED *S. C. C. LAYOUT WITH SAFETY GROUND TRIP PROTECTS MEN AND MACHINES

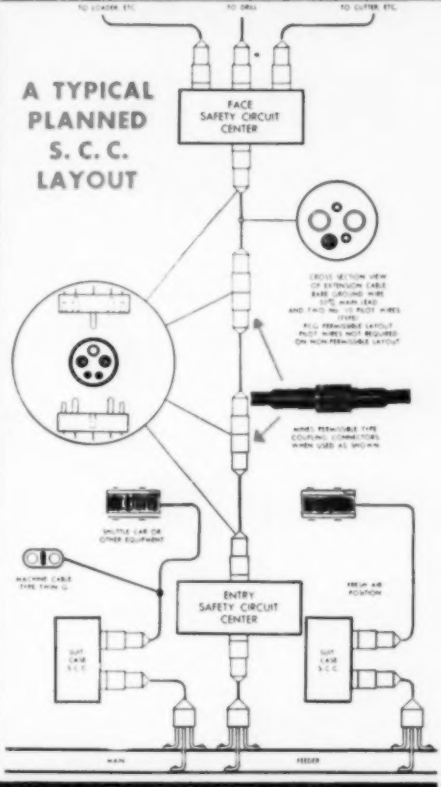
A MINES Safety Circuit Center will immediately shut-off current to a machine when its frame becomes charged as a result of insulation or cable failure. This promotes higher maintenance levels and reduces mine fire hazards due to cable faults.

*Safety Circuit Centers

- ✓ Now made to meet needs of both high and low seam mining.
- ✓ Are available in Permissible or Dust-Resistant housings.
- ✓ Have fast acting circuit breakers with adjustable magnetic trip.
- ✓ Are available for all conventional A. C. and D. C. mining voltages.
- ✓ And have sectionalized cable assemblies with water-proof Connectors that drop their load in the process of opening.

Consult a Joy Engineer

A brief description of your requirements will enable him to furnish pertinent details—without obligation.



SALES AND SERVICE TO THE MINING INDUSTRY EXCLUSIVELY BY

JOY MANUFACTURING COMPANY

HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

MANUFACTURED BY

MINES EQUIPMENT COMPANY

4229 CLAYTON AVE. MINES ST. LOUIS 10, MO.

COAL PRODUCERS:

Dollars Are Important to You

Dollars saved are dollars earned. So why shouldn't you save every dollar you can . . . on *delivery* costs? Dodge "*Job-Rated*" trucks are built to do just *that.*

They're priced with the lowest. They're built *to fit* your particular hauling needs. They stay *out* of the repair shop and *on* the job . . . saving money every mile you drive them.

For example, your Dodge truck will have the right one of 7 "*Job-Rated*" truck engines. You will pay only for the power you need . . . on *your* job.

Your Dodge will have the right clutch, transmission, rear axle, and every other unit . . . "*Job-Rated*" for maximum dependability; minimum upkeep expense.

So, if dollars still count in *your* business, see your Dodge dealer. Ask him to recommend the right "*Job-Rated*" truck for your business. Remember . . . *only* Dodge builds "*Job-Rated*" trucks.

For the good of your business—

Switch to "Job-Rated" DODGE TRUCKS

50 YEARS

CUSTOM-ENGINEERED MINE CARS . . .

ENTERPRISE

WHEEL AND CAR CORPORATION
BRISTOL, VIRGINIA - TENNESSEE
HUNTINGTON, WEST VIRGINIA

Coal Facts #5 ...A ONE MINUTE QUIZ...FOR MEN IN THE COAL INDUSTRY

1. Where does BITUMINOUS coal get its name?

2. Where does ANTHRACITE coal get its name?

3 When was coal first used on the North American Continent?

4. Only one underground loading machine has an automatic parallel lift rear conveyor. Do you know which one?

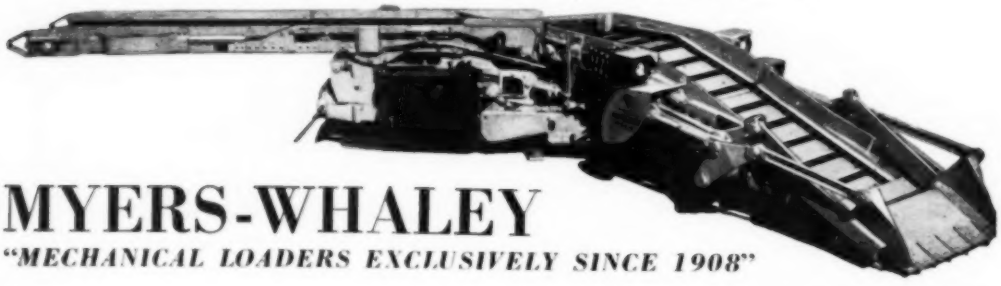
Answers:

1. Bituminous coal is so named because it contains "bitumen," a Latin word for mineral pitch.

2. Anthracite gets its name from the Greek word "Anthraces," the name the Greek philosopher Theophrastus gave to coal found in Thrace, a section of Greece in the ancient world.

3. Known records show that coal was used in North America as early as 900 A. D. by the Hopi Indians in what later became Navajo County, Arizona. These Indians used lignite to burn pottery.

4. The Whaley "Automat" is the only underground mechanical coal loading machine that has the automatic Parallel Lift Rear Conveyor. Loading cars to full capacity in limited head room is no problem for the "Automat" . . . the rear conveyor is always parallel to the top of the car at any height to which the conveyor is set. Height of the conveyor is hydraulically controlled at operator's position and the parellel feature is automatic. This is one of several important reasons why you will want your next coal loading machine to be a versatile, shovel-action Whaley "Automat." Full details freely given: Myers-Whaley Co., Knoxville 6, Tennessee.



MYERS-WHALEY

"MECHANICAL LOADERS EXCLUSIVELY SINCE 1908"

JR ROEBLING

TURN TO PERFORMANCE THAT

PAYS OFF

Preformed
"Blue Center"
Wire Rope

PROVEN ECONOMY IN THE MINES

YOU SAVE TWO WAYS with Roebling Preformed "Blue Center" Wire Rope. *First*, you save because "Blue Center" Steel—an exclusive Roebling development—gives rope extra toughness, extra stamina to resist shock, and longer service life.

Second, you save because Roebling Preforming provides a rope that's easier to handle and install . . . that performs better on the job. It practically abolishes vibration and whipping . . . improves winding . . . is much less inclined to develop sets and kinks.

Roebling wire rope is one of the most widely used products in industry today. Whatever your requirements, there's a type and size for real efficiency and minimum expense.

Have your Roebling Field Man suggest the *right* rope for most economical service. John A. Roebling's Sons Company, Trenton 2, New Jersey.

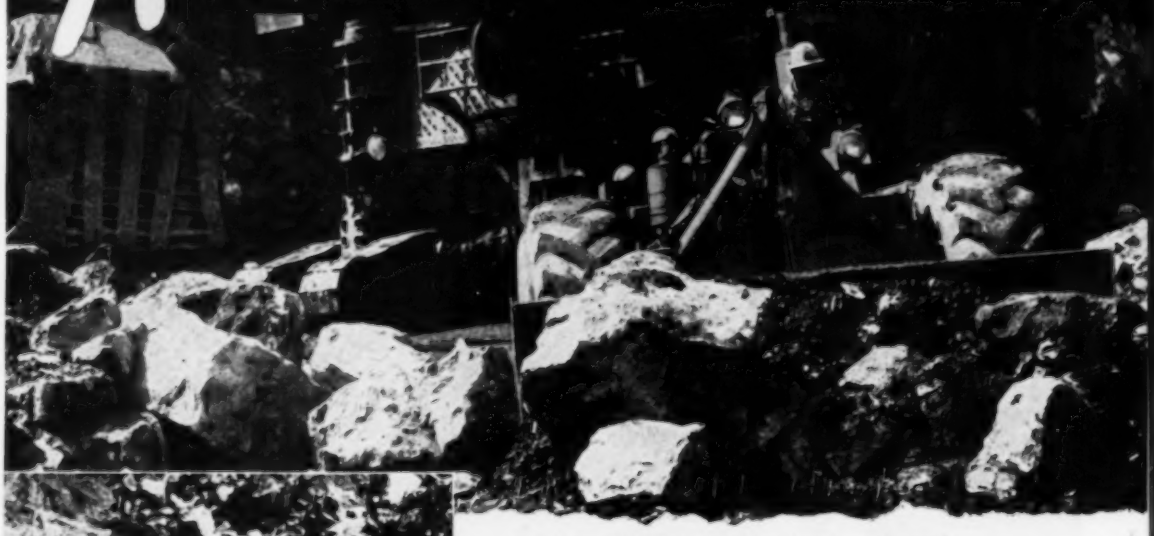
WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. • *Boston*, 51 Sleeper St. • *Chicago*, 5525 W. Roosevelt Rd. • *Cleveland*, 701 St. Clair Ave., N. E. • *Denver*, 1635 17th St. • *Houston*, 6216 Navigation Blvd. • *Los Angeles*, 216 S. Alameda St. • *New York*, 19 Rector St. • *Philadelphia*, 12 S. 12th St. • *Pittsburgh*, 355 W. North Ave. • *Portland, Ore.*, 1032 N. W. 14th Ave. • *San Francisco*, 1740 17th St. • *Seattle*, 900 First Ave.

ROEBLING

☆ A CENTURY OF CONFIDENCE ☆

Hanna uses high- for clean-up



Works with 40-yard stripping shovel

Hanna Coal Company makes good use of the high speed and mobility of the rubber-tired Tournadozer at their Georgetown mine #12 near Georgetown, Ohio. Tournadozer is used for clean-up around their 40-yard stripper, in addition to many other scattered job assignments around the pits. The shovel stripping operation, which consists of overcasting overburden of limestone and sandstone shales up to 85' to uncover a coal seam, is on 24-hour-day, 7-day-week basis.

Mine Superintendent, Donald D. Saxton, says:

"This machine has many advantages as a clean-up tractor under large stripping shovels. It has adequate traction for the job and its rubber tires prevent tearing up the coal. Its greatest advantage to a wide-spread operation, such as this, is its extreme mobility."

From Operator Paul Thomas:

"It sure has lots of power and will handle big loads of rock. I have used it to make fills and drains, too. On

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the fills I moved way more dirt . . . made more passes and carried more dirt each pass."

From Operator John Dulkoski:

"It sure is easy to operate and powerful. It's fast and maneuverable around a shovel. I have no trouble pushing out a stalled truck. It's good for hauling a lowboy down highway. I went to get a big Bucyrus-Erie 44B shovel at another pit. It was about 8 miles and I made it in about ½ hour. I like the fast blade action. There's not much greasing to do either. The quick shift lets me get in and out under shovel faster — doesn't hold up the shovel."

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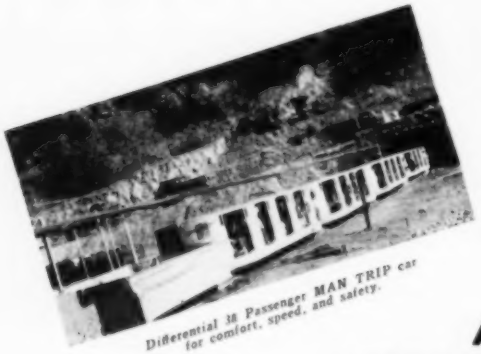

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CHAIN NO.	MATERIAL	APP'X PITCH	MAX. WK. LOAD	BREAK. POINT
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348	EEE-Heat Treated	3"	4,500	24,000
348	3140-Heat Treated	3"	4,800	27,000
348	3240-Heat Treated	3"	6,000	31,000
458	EEE-Normalized	4"	8,000	37,000
458	EEE-Heat Treated	4"	10,000	47,000
458	3140-Heat Treated	4"	12,000	49,000
458	3240-Heat Treated	4"	13,500	53,000
468	EEE-Normalized	4"	17,000	95,000
468	EEE-Heat Treated	4"	28,000	106,000
468	3140-Heat Treated	4"	32,000	120,000
468	3240-Heat Treated	4"	36,500	130,000
678	EEE-Normalized	6"	16,000	70,000
678	EEE-Heat Treated	6"	20,000	81,570
678	3140-Heat Treated	6"	25,000	90,000
678	3240-Heat Treated	6"	30,000	100,000
688	EEE-Normalized	6"	28,000	110,000
688	EEE-Heat Treated	6"	40,000	124,000
688	3140-Heat Treated	6"	41,000	135,000
688	3240-Heat Treated	6"	50,000	154,000
698	EEE-Normalized	6"	18,000	120,000
698	EEE-Heat Treated	6"	28,000	137,500
698	3140-Heat Treated	6"	32,000	149,000
698	3240-Heat Treated	6"	36,000	170,000
998	EEE-Normalized	9"	18,000	120,000
998	EEE-Heat Treated	9"	28,000	137,500
998	3140-Heat Treated	9"	32,000	149,000
998	3240-Heat Treated	9"	36,000	170,000
9118	EEE-Normalized	9"	40,000	200,000
9118	EEE-Heat Treated	9"	60,000	223,000
9118	3140-Heat Treated	9"	70,000	250,000
9118	3240-Heat Treated	9"	76,000	290,000
9148	EEE-Normalized	9"	53,000	270,000
9148	EEE-Heat Treated	9"	80,000	300,000
9148	3140-Heat Treated	9"	92,000	345,000
9148	3240-Heat Treated	9"	104,000	375,000
105208	EEE-Normalized	10½"	70,000	350,000
105208	EEE-Heat Treated	10½"	110,000	395,000
105208	3140-Heat Treated	10½"	122,000	450,000
105208	3240-Heat Treated	10½"	132,000	495,000
105208	Cast Alloy Steel	10½"	128,000	460,000

EEE, listed above, is a special alloy steel made for Wilmot "Keystone Rivetless" chain. It is used for most stock chain because it proves superior in service on the majority of materials-handling applications. A substantial stock of chains made of alloy steels 3140 and 3240 is also maintained, although we do not assure ready shipment of all sizes. In addition to the above materials Keystone chain will be furnished in any alloy steel to meet your specific problems: corrosion, abrasion, temperature, load.

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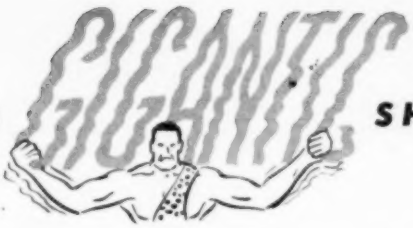

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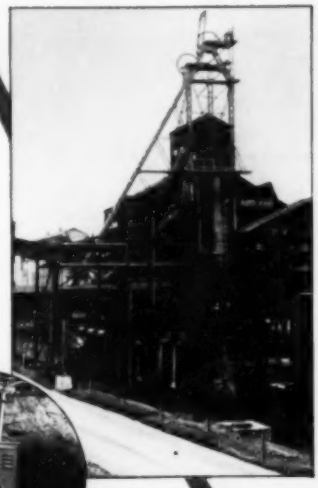

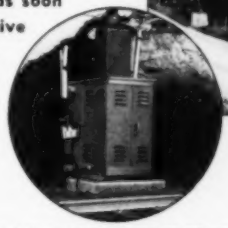

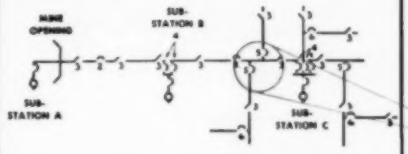

THE RECOMMENDED D-C SECTIONALIZING PRACTICES:

Key

1. In each of the following cases, sufficient feeder and return circuit capacity should be provided so that the overcurrent protective device will be opened by a dead short-circuit at the most remote point of the circuit.
2. An overcurrent protective device should be installed between each two substations at such a point in the circuit that the resistance between each station and the device is approximately the same.
3. A disconnect switch or protective device should be placed at not more than 1,500 ft. intervals in every power line.
4. An overcurrent protective device should be used in each circuit leaving a substation. If automatic reclosing circuit breakers are employed for this, trip free operating mechanism should be used.
5. An overcurrent protective device should be placed at each main-branch circuit.
6. Each mining setup should be protected by an overcurrent protective device. In some cases, it may be necessary to protect two setups by one device.

Placing an I-T-E Type KSC Automatic Reclosing Circuit Breaker on each main-branch circuit effectively and dependably prevents trouble on one branch from spreading to others.

In event of overload, short circuit, or excessively low voltage, the KSC opens instantly, remains open a definite, predetermined time (1 — 45 secs.), and recloses automatically upon a return to normal line conditions. Faults are confined to the branch on which they occur, production in other sections goes on with complete safety! For further information on the I-T-E Type KSC — the only circuit breaker developed specifically for the mining industry — write for Bulletin 4611.

To find out how your mine can benefit from proper applications of I-T-E Sectionalizing Switchgear, consult the I-T-E Mining Specialist in your locality. He is thoroughly familiar with the Bureau of Mines' new recommended Standard Safety Rules for installing and using electrical equipment in coal mines, and he is fully qualified to advise and assist you in sectionalizing your electrical distribution system. Use his services without obligation.

Be Production-Wise . . . Sectionalize!

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JULY, 1949

IVAN A. GIVEN, EDITOR

Not the Answer

DEVELOPMENTS in June indicate that coal is taking a major step forward toward a better solution of one of its major problems—contract negotiation and relations with the union and its members. This step reflects the growing conviction that a full-time operator organization set up especially for the purpose can function more effectively in writing contracts and in achieving better day-to-day relations with the union and its members.

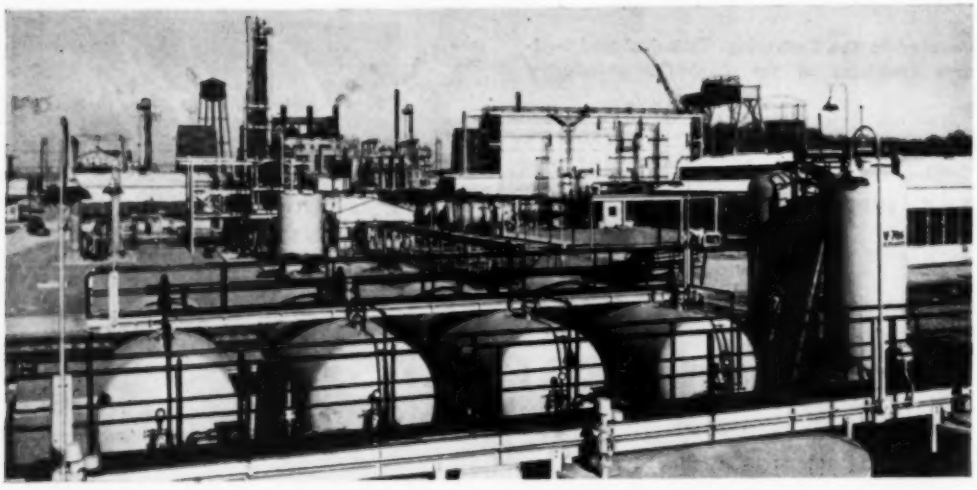
Balancing advantages against disadvantages leaves a substantial margin in favor of the plan as long as one man has full power on the union side. But the margin is not so clear for a second job reportedly suggested for the organization—"stabilization" through production control. Of all the possible steps that might be taken to achieve "stabilization," production control, despite some seemingly successful examples, is accompanied by the greatest number of hazards, especially if based on the Lewis plan.

So far, the Lewis prescription for stability seems to be equal sharing of available working time—the "starve-together" principle he enunciated at the last UMW convention. Such a policy is, of course, strictly negative. It envisions a static or contracting industry rather than an expanding one. If strictly applied, it puts all operations—good, bad and indifferent—on the same footing as far as market opportunities are concerned and reduces the incentive to cut costs and raise product quality. As a result, competition gets new encouragement and a new lease on life. And once this basis of sharing the work is accepted, the next step becomes practically inevitable: increasing the number of days to be shared by limiting worker and machine output, further weakening the industry's competitive position through complete elimination of the normal incentives to progress. The British coal-mining industry went to pot because management and government assumed that a monopoly existed and therefore there was no need for striving for greater efficiency and better service to the consumer. In essence, Mr. Lewis would force a similar policy on the American coal-mining industry.

Stabilization in the sense of maintaining the status quo is deadly to any industry. Unless the industry moves forward and grows, it must slip back. And if an industry is to move forward and grow, its members must have freedom to experiment, to adopt new methods and equipment and get the full benefit from them, to change their course and—even—to fail. Only thus can healthy competition—the real spur to progress—be maintained.

In the final analysis, a progressive and expanding industry is the best assurance of a good living for employees as well as employers. To progress and expand, industry members must be free to take the necessary steps to improve their competitive position and render a better service. Artificial restrictions on productivity are not the answer. Neither are sudden and arbitrary work stoppages. The fact that fundamentally coal's prospects are excellent does not alter the fact that men as well as management have a real job ahead of them if they are to make the most of these prospects. To achieve maximum progress, therefore, workers and their representatives should be directing their efforts toward helping management broaden the market for coal through:

1. Efficient operation for low cost.
2. Quality production.
3. Uninterrupted service.
4. Increased research.
5. Good public relations.
6. The best in merchandising methods and service to consumers.



HYDROGENATION DEMONSTRATION PLANT at Louisiana, Mo., now is making up to 300 bbl per day of oil from coal. Diesel fuel from this plant powered the train that hauled officials and guests from St. Louis to the dedication ceremonies at Louisiana, May 8.

Making Oil From Coal

Synthetic Liquid Fuels From Coal Nearer as Bureau of Mines Makes Steady Advance—Over 200,000,000 Tons per Year May Be Needed—Two Ways to Liquefy Coal —Higher Mining Efficiency and More Research Urged

By W. A. STANBURY JR.
Assistant Editor, Coal Age

A NEW MILESTONE was passed in progress toward a commercial synthetic-liquid-fuels industry in the United States when, on May 8, federal officials met with industrial executives and other invited guests at Louisiana, Mo., to dedicate two coal-to-oil demonstration plants—a $10,000,000 hydrogenation plant to produce 200 to 300 bbl per day of various grades of liquid fuel and a $5,000,000 gas-synthetic plant which, when completed about the end of this year, will turn out 80 to 100 bbl per day of motor gasoline and diesel fuel.

Full development of this new industry to a capacity of 2,000,000 bbl per day of liquid fuels would make the United States independent of Near East oil in any emergency. For the bituminous industry, assuming that half of the liquid-fuel output will be from coal, there will be a need for between 190,000,000 and 210,000,000 additional tons per year to feed the plants, not to mention what will be needed for steam and power.

Aside from steps taken by private industry looking toward synthetic liquid fuels, major milestones passed thus far in the government's coal-to-oil program include the following:

1. **APRIL, 1944**—Synthetic Liquid Fuels Act passed by Congress, appropriating $30,000,000 for a three-year study of ways to make oil from coal, oil shale, forestry and agricultural products and other raw materials.

2. **DECEMBER, 1945**—Hydrogen-making and pressurizing facilities of former Missouri Ordnance Works, Louisiana, Mo., taken over by the Bureau of Mines.

3. **FEBRUARY, 1946**—Major contracts let for building gas-synthesis and hydrogenation pilot plants at Bruceton, Pa. Gasification studies launched at Bureau laboratory, Morgantown, W. Va.

4. **JANUARY, 1947**—Coal bed ignited in first underground gasification experiment at Gorgas, Ala.

5. **MARCH, 1948**—An additional $30,000,000 authorized by Congress to add three years to the program.

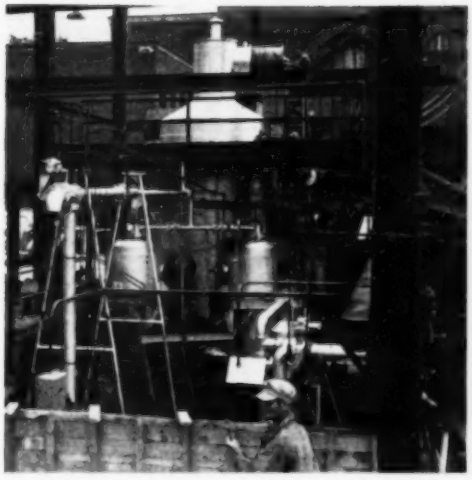
6. **MAY, 1948**—Synthetic-fuels laboratory and pilot plants dedicated at Bruceton, Pa.

7. **MARCH, 1949**—Second underground gasification experiment fired at Gorgas, Ala.

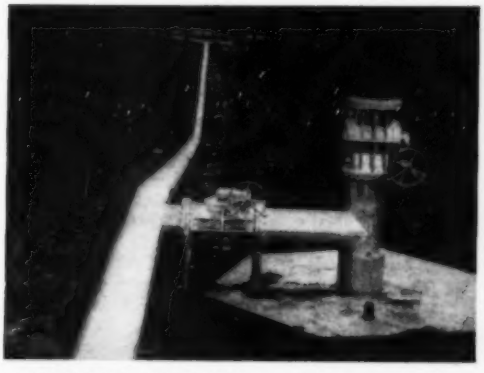
8. **MAY, 1949**—Hydrogenation and gas-synthesis demonstration plants dedicated at Louisiana, Mo.

Those stages mark good progress in spite of obstacles—the basic research needed, the tedious collection and study of data from German plants, the need for schooling American manufacturers in producing the special equipment needed and the short supply of some critical building materials, to say nothing of strong opposition to building coal-to-oil demonstration plants, voiced by some interests who argue that the oil and gas indus-

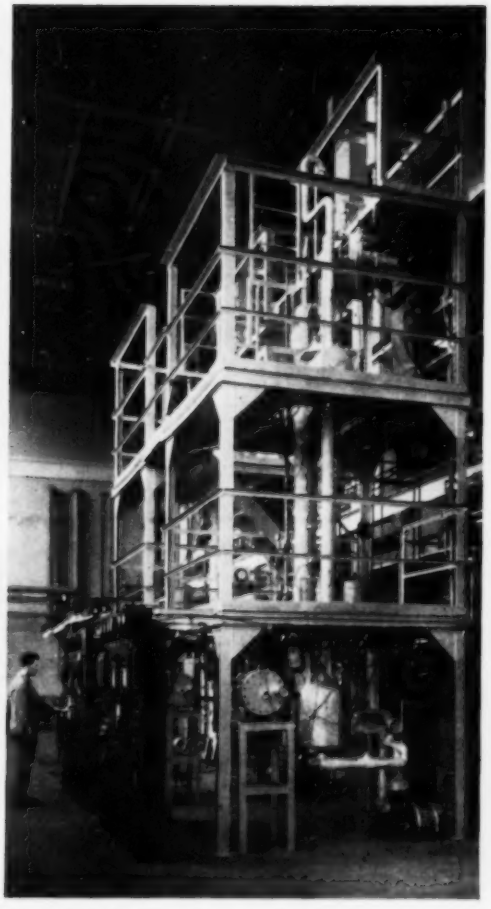
Photos: U. S. Bureau of Mines.



DIRECT GASIFICATION of coal is the target at Morgantown, W. Va. Experts hope to make cheap gas for Fischer-Tropsch process.



UNDERGROUND GASIFICATION of coal at Gorges, Ala., if successful, will reduce cost of making oil from coal.



GAS SYNTHESIS pilot plant, Bruceton, Pa., provides data for building demonstration plant, scheduled for completion in 1950.

tries themselves can meet all future oil needs.

The question of petroleum reserves already has been pretty thoroughly explored in previous issues of *Coal Age* (January, 1949; February, 1949). The fact that the United States is running on a thin margin is borne out further in figures recently published in the *Oil & Gas Journal*. These figures show that while crude oil reserves increased 8.34% in 1948 over 1947, production increased 8.4%. Meanwhile, the ratio of reserves to output changed from 11.61 in 1947 to 11.63 in 1948—a negligible upward movement that easily could become a dangerous deficit if petroleum needs were sharply increased in a national emergency. To delay development of a substantial coal-to-oil industry until more liquid fuels are desperately needed would be too late and too little, for it takes time to build plants, recruit and train men to run them, gather essential raw materials and swing into full production.

Gathering experimental and operational data that will guide the growth of a commercial synthetic-liquid-fuels industry and thus narrow the gap between need and supply is the task of the Bureau of Mines. How complex and how well integrated is the program? How far has it advanced? How is raw coal changed into oil and gasoline? What is coal's share in the program?

The quantity of oil that could be produced from fuel reserves, known as well as estimated and inferred, based on (1) 50% mining recovery of coal and lignite and (2) the assay yield of oil shale in Colorado and 75% mining recovery, adds up as follows:

	Total Oil Yield (Millions of barrels)	Percent of Liquid-Fuel Reserves
Coal and lignite	2,600,000	86.5
Oil shale	270,000	9.0
Petroleum and natural-gas liquids.	86,000	2.9
Natural gas..	48,000	1.6

Liquid fuels recoverable from oil shale are estimated to be 125 times present annual consumption of petroleum. Big deposits and low mining costs in the neighborhood of 50c per ton, however, are offset

Two Ways to Make Oil From Coal—Gas Synthesis and Hydrogenation

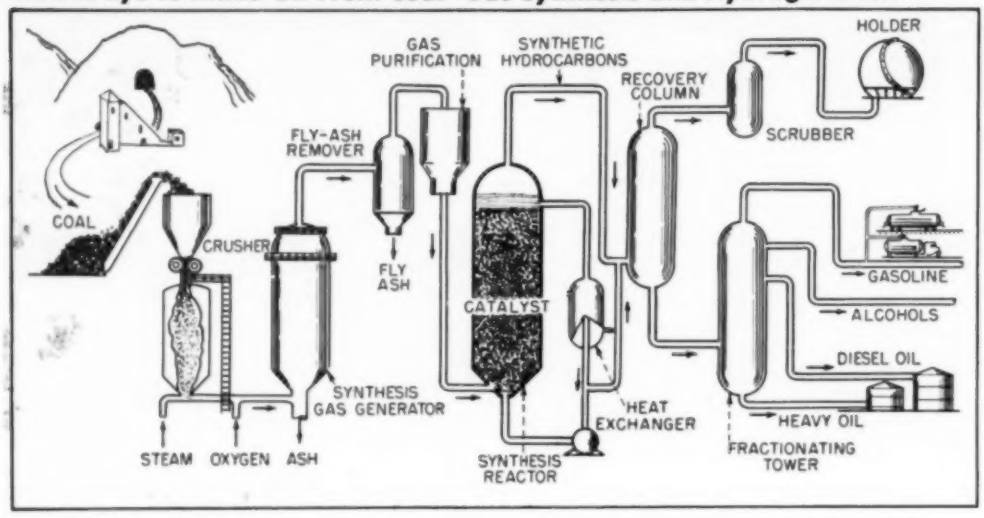
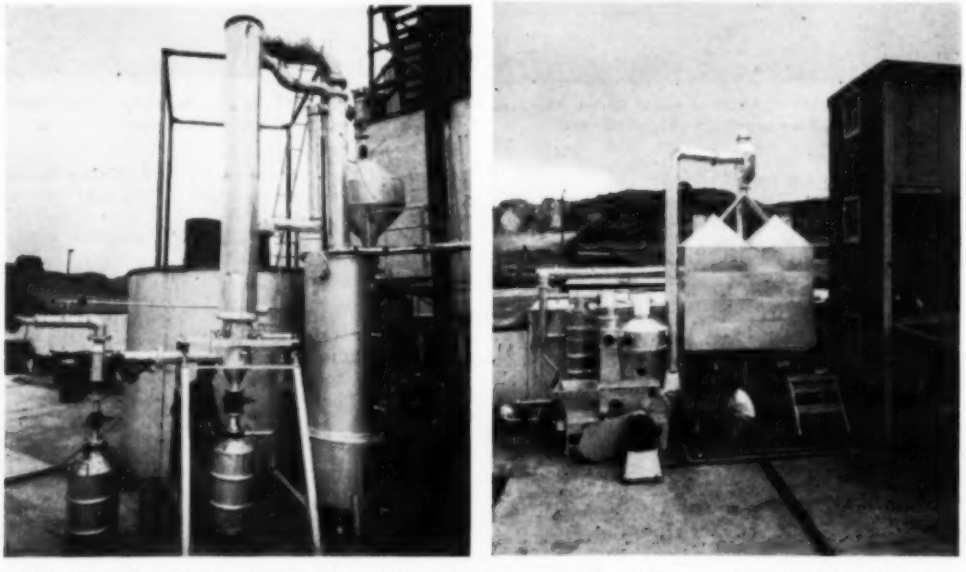


FIG. 1—GAS-SYNTHESIS PROCESS, known also as Fischer-Tropsch method, requires that coal be gasified as a preliminary step.

in some degree by the distance between major oil-shale deposits in Colorado and Wyoming and big fuel markets, and by the scarcity of water in that area.

On the natural-gas side, conversion into liquid fuels means a loss of about half the Btu content of the gas. Besides, most big fields already are committed to pipeline markets and their output could not be shunted to liquefying plants without some serious economic upsets. In addition, a gas-to-oil plant producing 10,000 bbl per day would require 40,000,000,000 cu ft per year, or a total of 1 trillion cu ft for a plant life of 25 years. There are not many gas fields of this size available. All told, it is estimated that something like 15 trillion cu ft might be available for conversion to liquid fuels—enough for 150,000 bbl of oil per day for 25 years. That is not enough.

As for coal, a 10,000-bbl-per-day coal-to-oil plant would use about 6,000 tons per day of bituminous, or about 60,000,000 tons in 25 years. A coal bed 8 ft thick in an area



DRYING METHODS developed at Golden, Colo., probably will be useful in preparing coal for conversion to liquid fuels. Fluidized-bed (left) and flash-drying techniques remove up to 90% of bed moisture from 1/8x0 and 1/16x0-in sizes.

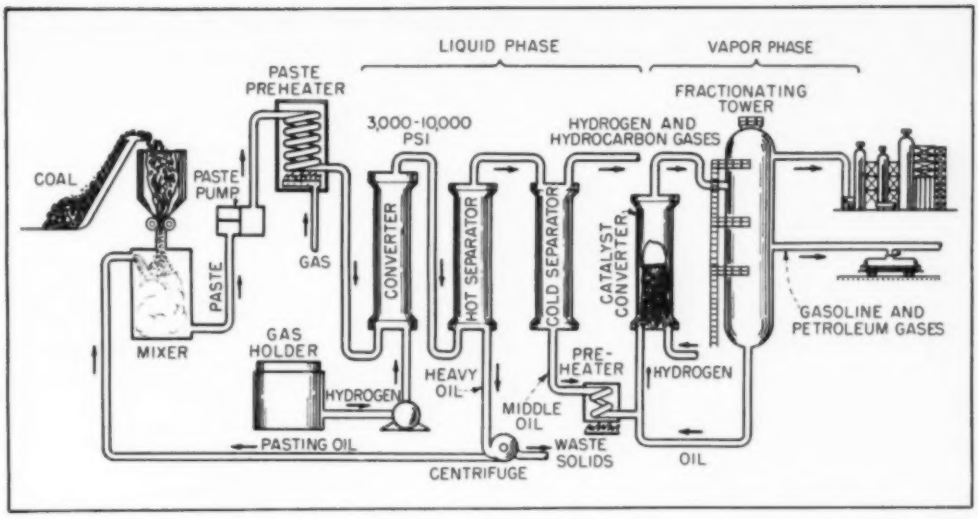


FIG. 2—DIRECT HYDROGENATION, or Bergius process, liquefies coal under high pressure with addition of hydrogen.

about 10 sq mi would be adequate. Sites that fill this bill are located in 20 states. In the East, high-Btu coal and adequate water are available close to major fuel markets. In the Rocky Mountain region and the northern Great Plains, where some 65% of the coal reserves lie, coal seams are thicker and in many instances can be stripped easily.

Thus, from the standpoint of reserves and accessibility, coal is in a more favorable position than other resources to provide the raw materials for a large synthetic-liquid-fuels industry.

The big difference between coal and crude petroleum is that petroleum contains about twice as much hydrogen as coal. By adding hydrogen and rearranging the structure of hydrogen and carbon molecules, coal can be converted to oil under the right conditions of pressure and temperature and with the help of certain catalysts. Two basic processes, indirect conversion by gas synthesis (Fig. 1) and direct hydrogenation (Fig. 2), bring about this change.

For hydrogenation as well as gas synthesis, the coal should have good storage characteristics, uniform feed quality and low-ash and low-moisture content. High moisture, for example, would add to gasification costs by requiring additional oxygen simply to evaporate water. In the hydrogenation process, high moisture would cause foaming and increase compression costs. All this means that most coals must be cleaned and dried before they can be processed.

To make coal preparation a precision process, men at the Bruceton laboratory are studying commercial cleaning methods. In time, they hope to predict the effect of changing by only two-hundredths of a point the specific gravity of cleaning media. The problem, they point out, is not one of basic methods but of more exact measurement, controls and analysis of product, especially for hydrogenation plants, where ash tolerances will be low. It may be possible, they add, to process the upper middlings in a gas synthesis plant, where ash tolerance is higher, and burn the lower middlings as power-plant fuel.

Two drying methods, especially for low-rank western coals and lignite, are under investigation at the Bureau's station at Golden, Colo. Although that station is not under the direction of the Office of Synthetic Liquid Fuels, the methods under study there may be especially useful in direct hydrogenation, to which low-rank coals are peculiarly suited.

One drying method, used on 1/16 x0-in coal, achieves up to 85% efficiency by flashing particles entrained for 1.5 to 2 sec in a stream of gases at 600 deg F. The dried product has a bulk density of 45 lb per cubic foot and is free-flowing.

In another process, used on ¼x0-in coal, inert gases from a combustion chamber at the bottom of a drying column pass upward through a perforated alloy grate and through the coal bed at 600 deg F, agitating the particles and creating a fluidized bed. As the particles lose moisture, they also lose weight, until they are light enough to rise with the gas stream and pass out through the top of the column and into storage. A drying unit of this type, with a capacity of 2,000 tons per day, would have to be only 12 ft in diameter and about 15 ft high.

On the whole, drying methods developed at Golden have produced the following results: (1) removal of over 90% of bed moisture; (2) a boost in heating value of sub-bituminous by 25% and of lignite by 45%; and (3) weight reduction equal to about 90% of the weight of the moisture removed, meaning that drying costs of 25 to 35c per ton would be offset by reduced freight charges for distances between 40 and 50 mi and would bring actual savings for longer hauls.

To improve storage methods for sub-bituminous coals, thus preventing spontaneous firing, the men at Golden have come up with an open-pit method which involves leveling and compacting 3-ft layers to a density of about 56 lb per cubic foot and sloping the sides to below 20 deg from the horizontal. In a 60,000-ton stockpile, a loss of only 1 to 1.5% was suffered over an 8-month period and there were no fires.

Solving storage, preparation and drying problems, however, is not the biggest job taken on by the Bu-

reau. The really thorny problem is coal gasification. Some 60 to 70% of the cost of gas-synthesis end products now is chargeable to making synthesis gas and 30 to 50% of the cost of hydrogenation end products is chargeable to the large quantities of compressed hydrogen required. It is estimated that production of 500,000 bbl per day of liquid fuels by gas synthesis will require 14,000,000,000 cu ft of gas per day; by hydrogenation, 4,000,000,000 cu ft of hydrogen per day. Believing this to be the most vulnerable point in the cost of synthetic liquid fuels, Bureau engineers are attacking gasification.

Since coke-making is a costly stage in the usual methods of making synthesis or water gas, as well as hydrogen, the Bureau is exploring ways to make synthesis gas directly from coal. Elimination of the coke-making stage, besides cutting costs, also widens the range of coals that can be used.

Seek Cheaper Gasification

Three methods for direct gasification of high-rank bituminous are being investigated as follows: (1) at Pittsburgh, a vortex gas generator; (2) at Gorgas, Ala., underground gasification; and (3) at Morgantown, W. Va., a continuous high-temperature pebble-stove gasifier.

At Morgantown, two pebble stoves, each containing a 30-in diameter refractory with a 4- to 5-ft bed of magnesium-oxide pebbles, alternate in raising to nearly 4,000 deg F the temperature of steam fed in at 300 deg F. Pebble-stove heat is provided by burning natural gas and air. While the pebbles in one stove are being raised to the desired temperature, steam is passed up through the already heated pebbles in the other stove, assuring a continuous feed of superheated steam to the gas generator and thus reducing the quantity of oxygen needed.

The superheated steam is fed tangentially into the gas-generating chamber. Pure oxygen and powdered coal (80% minus-200-mesh) are fed in radially, about 200 lb of coal per 1,000 cu ft of oxygen. The gasifying reaction takes place at temperatures near 2,700 deg F at a pressure only a little above atmospheric. Product gas, containing carbon monoxide and hydrogen with some impurities, is drawn off with residue at the top. The runs thus far have produced a good grade of synthesis gas, with at least 90% conversion of the feed coal to gas.

At Gorgas, with data on the 1947 trial run on underground gasification and with additional data from laboratory-scale studies at Morgantown, Bureau engineers and Alabama Power Co. experts recently fired a much larger block of coal under deeper cover. The primary problem at Gorgas still is to find out whether underground gasification is really workable; that is, whether burning will be self-sustaining and economical. After that, efforts will be made to produce the kind of gas wanted—not necessarily a high-Btu gas but a gas with the desired balance of carbon monoxide and hydrogen. For making oil from coal by gas synthesis, approximately equal parts of carbon monoxide and hydrogen are needed; by hydrogenation, large quantities of hydrogen.

In the Bureau's Pittsburgh laboratories, a small-scale vortex gasifier some 4 ft in diameter and about 14 in deep is being studied. Powdered coal (nearly 100% minus-100 mesh and 70% minus-200-mesh) is fed from above into the chamber by means of a small rotating table which permits exact feed control. The particles react with oxygen and steam at 800 to 900 deg F, a fast whirling motion being created by tangential entrance of the oxygen and steam. Three forces influence the movement of the coal particles: (1) centrifugal, which throws larger particles toward the outside wall; (2) gravity, which draws the particles down; and (3) Stokes' law, which directs the particles towards the center of the spiral as they grow smaller under reaction. Spent particles, reaching the center and bottom of the chamber, pass with the gas through the bottom outlet.

Gas From Low-Rank Coals

In addition to gasifying bituminous coals, the Bureau is experimenting with ways to make gas from sub-bituminous coals and lignites. This work is going on at Golden, Colo., and Grand Forks, N. D., though not under the Office of Synthetic Liquid Fuels. Greatest interest now is centered on an externally heated two-chamber retort, producing up to 2,300 cu ft of gas per hour per square foot of fuel bed when using sub-bituminous and up to 1,100 cu ft when using lignite. The ratio of hydrogen and carbon monoxide ranges between 1.9 and 10, with most economical operation achieved with a ratio of from 2 to 2.5. Although gas output is lower than with a conventional internally heated retort, the new design with external heat eliminates any need for coke and oxygen and substitutes a continuous process for the conventional cyclical process.

External heat for the retort is provided by high-temperature gases traveling at high velocity, 12 to 15 fps, around an annulus surrounding the reaction chamber. Researchers at Grand Forks and Golden, having tried several heat-transfer materials for the chamber wall, now believe that a combination retort, with silicon-carbide walls for the hottest section and heat-resistant alloy steel in the cooler upper section, will produce 50,000 cu ft of gas per hour in a retort 20 ft long and 6 ft in diameter. The potential heat in gas produced in the upper chamber ranges from 44 to 68% of the feed-material heat, but after the char residue is gasified in the lower chamber, total heat recovery is about 85%.

Sulfur and Dust Removed

Whatever way is found best to gasify coal—whether by retort, vortex or pebble-stove generator—the gas must be cleaned and purified. This is especially true of gas used to make oil from coal by gas synthesis, a process in which more than 0.1 grain of sulfur per 100 cu ft breaks down catalyst action and in which the dust limit is under 0.2 grain per 100 cu ft.

The first step in gas purification probably will be dust removal, either by Aerotec separators or by a rough water wash followed by electrostatic precipitation. A pilot plant now is ready at Morgantown to study removal of dust, hydrogen sulfide, tar, organic sulfur and other impurities. High temperatures probably will destroy most of the tars and alcohols and may decompose inorganic sulfur compounds, leaving only hydrogen sulfide to be removed by methods already in general use.

While the search for better gasifying and purifying methods goes on, Bureau engineers at Bruceton, Pa., and Louisiana, Mo., assuming that gasification will be perfected elsewhere, are working on the actual basic conversion processes that eventually will turn coal into oil. The pilot plants at Bruceton are using natural gas instead of synthesis gas made from coal to provide the carbon monoxide and hydrogen for gas synthesis and the hydrogen for coal hydrogenation.

Likewise, the hydrogenation demonstration plant at Louisiana is using a wartime government ammonia plant to extract hydrogen from natural gas.

Gas to feed the gas-synthesis demonstration plant at Louisiana is made in a German-developed Heinrich Koppers generator—a refractory-lined horizontal steel shell 6½ ft in inside diameter and 9 ft long.

Making Gas at Louisiana

The Koppers generator, fired up in the first quarter of 1949, before the demonstration plant itself was anywhere near finished, gasifies powdered coal (80% minus-200-mesh) with 98% pure oxygen and steam at 2,500 deg F. Burning 1 ton of coal per hour, it will produce 90,000 cu ft of carbon monoxide and hydrogen, plus carbon dioxide and other products. The ratio of hydrogen to carbon monoxide can be varied from 1.5 down to 0.7.

Oxygen for the gasifier is provided by a Linde-Frankl plant brought from Germany. Producing 23,000 cu ft (1 ton) of 98%-pure oxygen per hour, the plant is made up essentially of steel vessels packed with coils of corrugated aluminum strips which alternately absorb and give up heat. Incoming air is chilled to –300 deg F as it flows past the aluminum strips in one pair of regenerators. Meanwhile, in another pair of regenerators, outgoing product oxygen and nitrogen cool the aluminum for the incoming air cycle. Valves are reversed every three minutes. Frost and dry ice left on the cooling surfaces are swept away by the oxygen and nitrogen stream.

Oxygen from the Linde-Frankl plant, together with coal, is fed into the Koppers gasifier through jets at either end. Superheated steam, raised to 2,500 deg F by a continuously operating pebble stove, enters through an annulus surrounding the oxygen-coal jets. The gases formed by reaction of the coal, steam and oxygen pass out into a waste-heat boiler, which reduces temperature to about 550 deg F and generates about 4,000 lb of high-pressure steam per hour. Fly ash is removed by cyclone separators and dust by two wet-flushing electrical precipitators. Compressed to 450 psi, the gas then is partly cleaned of organic sulfur and hydrogen sulfide, leaving only about 10 grains per 100 cu ft. The remaining sulfur, down to 0.1 grain per 100 cu ft, is removed in iron-oxide towers. The gas now is ready for conversion into oil, gasoline and other products.

Coal gasification now is as far as gas-synthesis operations can go at Louisiana, pending completion of the remainder of the demonstration plant. However, the gas-synthesis pilot plant now operating at Bruceton shows what can be expected later but on a larger scale at Louisiana.

At the Bruceton pilot plant, the raw material now is natural gas because, as stated earlier, it is taken for granted that coal gasification will be worked out elsewhere. The natural gas is changed to the type of gas to be expected from coal by removal of sulfur, treatment with steam and scrubbing. This produces a satisfactory synthesis gas, plus enough hydrogen to operate the adjoining hydrogenation demonstration plant.

Pilot Plant Blazes Trail

Two types of converters are being used at Bruceton, both of them representing improvements over German practices. One converter is an internally cooled type, the other a slurry type. Both operate at from 300 to 600 psi and at about 600 deg F.

The internally cooled converter at Bruceton contains a fixed bed of granular catalyst submerged in coolant oil. The converter, 3 in in diameter and 8 ft tall, receives synthesis gas at the rate of 300 volumes per hour per volume of catalyst space. The gas, together with some recycle gas, is heated to reaction temperature—about 600 deg F—in a heat exchanger. The hot gas and coolant oil rise upward through the catalyst bed and separate at the oil outlet near the top. The oil, passed through a waste-heat boiler where the heat absorbed inside the converter is discharged, is recycled as a coolant through the converter. The oil vapors, having been reacted by the catalyst, flow into a water-cooled condenser, where they are liquefied. The liquids, mostly oil and gasoline, are drawn off for storage or distillation and unreacted gas is recycled through the converter.

The slurry-type converter uses a finely ground iron catalyst suspended in coolant oil, the heat of reaction being removed by pumping cool water through steam-generating pipes submerged in the slurry. Gas enters at the bottom of the converter and flows up through the slurry, where it is reacted. As in the internally cooled converter, the reacted oil vapors are condensed into oil and gasoline and unreacted gases are recycled.

The slurry-type converter has at least two advantages: (1) since the slurry-type catalyst is useful only when finely-ground, disintegration is no problem as it is with the granular catalyst; and (2) with steam-generator tubes submerged in the reaction zone, converter temperature can be controlled simply by changing the steam pressure rather than by pumping coolant oil into and from the converter, as must be done with the internally cooled converter. In addition, the slurry type delivers a higher yield of more desirable liquid products.

Liquids from both converters are treated alike, except that powdered catalyst must be removed from slurry-converter products by centrifuging and filtering. Liquids pass into conventional distillation columns, where raw gasoline is recovered as an overhead product, diesel and heavy distillate fuel oils as a side stream and additional coolant oil as a bottom product. The gasoline is further stabilized and debutanized, about 95% of the raw gasoline being recovered as a finished product. Hydrocarbons recovered in the oil scrubber can be polymerized into high-quality motor gasoline. The diesel-oil fraction, like the gasoline, must be stabilized and its ignition properties improved.

Improve on German Methods

A good deal of investigation still must be done on various catalysts, which determine the proportion of carbon monoxide and hydrogen needed in the synthesis gas. For example, a cobalt catalyst requires two parts of hydrogen and one of carbon monoxide; an iron catalyst, equal parts of both. Thus far, an iron compound seems to give best results, though ammonia, copper, nickel and cobalt compounds have been used successfully. Bruceton technicians are carefully checking size, shape, porosity and surface area of various catalysts to find out what factors control operating efficiencies and end-product proportions.

Bureau engineers already have gone far beyond German methods of gas synthesis. For example, German converters were horizontal but Bureau converters stand upright, speeding the flow of gas through the catalyst and saving plant floor space. The use of oil as a heat exchanger, likewise a Bureau develop-

ment, also cuts down space requirements.

Direct hydrogenation of coal to make oil and gasoline differs from gas synthesis not only in methods but also in end products. In gas synthesis, the coal first must be gasified and then liquefied. In hydrogenation, process coal is liquefied directly, gas-making being only a service operation to provide hydrogen.

A hydrogenation pilot plant has been operating for several months at Bruceton and a 200- to 300-bbl-per-day demonstration plant, started up more recently at Louisiana, Mo., provided diesel fuel to power the special train that hauled officials and guests from St. Louis to the dedication of the Louisiana demonstration plants, May 8. There, at Louisiana, large quantities of compressed hydrogen, 98% pure, are obtained by reforming and scrubbing natural gas in a wartime synthetic-ammonia plant equipped with seven-stage compressors to drive pressure up to 10,000 psi. Thus, like the gas-synthesis pilot plant at Bruceton, the hydrogenation demonstration plant at Louisiana assumes the coal gasification will be improved either in the Heinrich Koppers generator or elsewhere.

How Hydrogenation Works

The two-stage hydrogenation process—liquid phase and vapor phase—will follow these lines in the Louisiana plant:

Coal, preferably low-ash, ground to pass a 60-mesh screen with no more than 15% minus-200-mesh, is mixed with heavy oil to form a paste with about 50% solids and about 35% coal on a moisture-and-ash-free basis. This paste, with a small amount of catalyst (0.5% iron oxide or 0.05% tin oxalate), is injected, with a little hydrogen to reduce viscosity, into a 10,000-psi system and preheated in a radiant-type heater to about 550 deg F. Hot hydrogen and hot recycle heavy oil then are added in the heater to push the temperature suddenly to 650 deg F, thus jumping coal's usual 600-deg swelling temperature. The mixture, still under high pressure, leaves the heater at 815 deg F and starts its journey through two liquid-phase converters.

The converters, made of 3% chrome-steel forgings, are 38 in in inside diameter and 35 ft high. The reaction chambers are 24 in in diameter, the annulus being filled with insulation to keep outside shell temperature below 500 deg F. Since the heat of reaction is very high, cooling hydrogen is added to keep the inside temperature down to 955 deg F. One hour's stay in the converters reacts 95% of the coal to liquid and gaseous products.

Reacted products enter a "hot catchpot," where hydrogen and light products are separated from heavy oil. The heavy oil, containing ash, catalyst, asphalt and unconverted coal, is drawn off at the bottom of the catchpot and, after passing through the pressure letdown system, is flashed with superheated steam to separate it from the impurities. The heavy oil is recycled as makeup oil for the primary paste. The residue, with a heating value of about 9,000 Btu per lb, can be used for plant fuel.

The light products—gases and vapors—leaving the top of the hot catchpot, are cooled and partly condensed in an exchanger and then move on to the "cold catchpot," where liquids and gases are separated. The gases, containing about 70% hydrogen, are washed at 10,000 psi to remove ammonia, hydrogen sulfide, soluble salts and light hydrocarbons. The hydrogen is recycled through the system. The liquids pass through a pressure letdown and, at about 100 psi, are charged into a distillation unit.

Distillation bottoms are recycled as pasting oil. Middle oil, gasoline and naphtha are separated as middle and upper fractions, thus providing a middle oil of constant quality for feeding the vapor-phase cycle, which follows. The naphtha is treated to remove phenols, cresols and xylenols and then is redistilled, the overhead being blended with gasoline from the upper fraction and the bottom with the fuel oil to reduce its viscosity. This completes the liquid-phase conversion.

Products Enter Vapor Phase

Middle oil from the liquid phase, combined with vapor-phase recycle middle oil and saturated with hydrogen sulfide or sulfur to maintain catalyst activity, is charged into the vapor phase. This mixture, together with some added hydrogen, is pumped at 10,000 psi through a preheater, where temperature is boosted to 900 deg F. The charge, vaporizing completely, reacts in a single converter containing six fixed catalyst beds of specially treated fuller's earth. When reaction is completed, an exchanger and a cold catchpot condense the vapors and separate the hydrogen, which is recycled. The liquids pass through a pressure letdown and move on to distillation. Bottoms from distillation are recirculated to the vapor-phase feed and the overhead product is stabilized to a 10-lb R.V.P. gasoline—a fair grade of motor gasoline.

Several lines of search are being followed at Bruceton and Louisiana to improve direct hydrogenation and cut costs. For instance, although high pressures and large quantities of hydrogen produce the highest yields of gasoline and oil, Bureau economists are studying the possibility of converting only half the coal to liquid fuels, the remainder going to coke breeze or gas. This way, operating pressures would be lower and less hydrogen would be needed, not to mention lower plant costs.

Search for Lower Costs

Other cost-saving possibilities include the following: (1) cutting down the reaction time; (2) finding ways to use more of the hydrogen in the coal instead of adding great quantities of hydrogen in the early stages and then recycling excess hydrogen in the later stages; (3) using water gas under certain operating conditions or using by-product hydrocarbon gases as a source of hydrogen; (4) increasing converter capacity; (5) using wrapped high-pressure vessels instead of the present forged vessels; and (6) improving heat conservation by more efficient heat exchangers and more recycling.

Stress on cost-cutting in hydrogenation arises largely out of the special chrome and nickel-alloy steels needed for the big high-pressure equipment, including pipes, and the heavy compressors and pumps needed for pressurizing paste and hydrogen. Gas synthesis, on the other hand, requires few special steels and little specialized construction because pressures and temperatures are much lower.

Even so, in spite of first-glance costs, hydrogenation must not be written off as too expensive. To begin with, the output of liquid fuels by hydrogenation is a little higher than by gas synthesis. Also, hydrogenation produces a wider range of fuels, depending on what products are recycled, what catalysts are used and how high temperatures go. Finally, the fuel products of hydrogenation are very dense, which means, for example, that a jet plane burning fuel made by hydrogenation can fly farther

on a given volume of this new fuel.

This does not mean that hydrogenation and gas synthesis are competitive and that the Bureau will settle on one or the other. The fact is, they are complementary and full development of each will create a well rounded synthetic-liquid-fuels program.

The various products of hydrogenation include the following: high-grade aviation fuel and aviation base stock, diesel fuel, heavy fuel oil, high-Btu jet fuel, liquid petroleum gas, a variety of heating gases and byproduct phenol, xylenols and cresols. A plant geared primarily to gasoline output, for example, could produce separately or simultaneously a jet fuel, a 45-octane diesel fuel, a heavy distillate fuel oil and a heavy residual fuel.

Gas synthesis, on the other hand, produces a range of 70 to 90% motor gasoline, plus some lower-Btu jet fuel, liquid petroleum gas and a limited variety of other products, including diesel oil, industrial waxes, ethyl alcohol, acetic acid and other chemicals.

Some measure of the cost of synthetic liquid fuels can be derived from the following Bureau estimates on a fully improved hydrogenation plant with a capacity of 30,000 bbl per day, including 21,500 bbl of gasoline, 7,200 bbl of liquid petroleum gases and 1,300 bbl of phenols, cresols and xylenols:

Capital costs:	
Hydrogen production and compression	$ 61,000,000
Hydrogenation, including coal preparation	80,000,000
Distillation; tanks and phenol recovery	16,000,000
Power, utilities and plant facilities	87,000,000
Total	$244,000,000
Manufacturing costs per gallon of gasoline:	
Coal ($3.56 per ton)	4.8c
Maintenance	2.1
Labor and supervision	1.3
Overhead, supplies and indirect costs	3.2
Amortization (15 years)	4.8
Taxes (1%)	0.7
Subtotal	16.9c
Credits:	
Liquid petroleum gas (8c per gal)	2.6c
Phenols (10c per lb)	5.0
Total net costs	9.3c

Total net cost of 9.3c per gallon does not allow for return on investment, sales expense or other costs. Also, without plant improvements, as pointed out earlier, gasoline costs might be as much as 4c higher and plant costs about 25% higher. Addition of 2c to the cost structure above, according to Bureau economists, would permit a fair profit and would shorten pay-out time to 10 years.

By changing the output of liquid products to make 42% gasoline, 42% diesel fuel and 16% liquid petroleum gas, manufacturing costs probably would be cut to 12.6c per gallon of total liquid products, taking no credit for chemical byproducts.

A gas-synthesis plant of similar size, on the other hand, is expected to produce 90% motor gasoline and 10% heavier products at a cost of 12.4c per gallon of total liquid products, again taking no credit for byproducts and making no charges for interest or profit.

Steel Needs Moderate

Steel needs for production of synthetic liquid fuels would not be out of line when compared with steel used by the petroleum industry, Bureau engineers contend. They point out that petroleum production and refining requires from 6 to 7 tons of steel for each barrel of new capacity and that coal-to-oil plants, including pipelines, would require only 6.4 tons per barrel of daily capacity.

Where will the coal come from? With great areas of untapped coal lands lying west of the Mississippi, up to 65% of the raw coal needed to make 1,000,000 bbl of oil per day probably would come from western fields, the remainder from the East. Assuming a total need of 575,000 tons per day, this would mean about 200,000 from the East and 375,000 tons from the West. With increased efficiency and more operating days per year, eastern producers probably could mine the required tonnage without adding much to manpower and without opening new mines. In the West, however, more miners would be needed and new mines would have to be opened. Over-all manpower needs for a full-scale coal-to-oil industry are estimated at 160,000 workers, 50,000 of whom would be coal miners.

The location of coal-to-oil plants will depend on several factors, the major factor being the availability of coal. A 20-year plant life, about the shortest that can be considered, would call for a daily mining capacity (260 days per year) of 6,000 tons of bituminous, 7,300 tons of sub-bituminous or 9,200 tons of lignite to make 10,000 bbl per day.

Water supply also will be a factor in plant location. A 10,000-bbl-per-day hydrogenation plant will require up to 9,600,000 gal per day intake and 6,600,000 gal net consumption for steam, power and other purposes. A gas-synthesis plant will require up to 12,100,000 gal per day intake and 8,100,000 gal net consumption. Lack of water in the West, therefore, may slow the growth of a coal-to-oil industry in that region, though western coals react exceptionally well and reserves are plentiful.

Other factors which may favor building coal-to-oil plants first in the East and Middle West are nearby markets, good transportation, adequate labor supply and the existence of ready-built facilities such as mines, housing, chemical plants, pipelines and coke plants.

Adding up all the facts, coal men and other interested groups can draw the following conclusions about the government's program and their own obligations:

1. Firm doubts about the adequacy of future oil supplies point up the need for a commercial-scale synthetic-liquid-fuels industry to strengthen national security, fill industrial and domestic needs and meet a growing demand for more sophisticated fuels than coal.

2. With a well integrated plan, the Bureau of Mines is making substantial progress in solving coal-to-oil process problems and cutting costs.

3. Coal will be called on for additional outputs in the order of 190,000,000 to 210,000,000 tons per year.

4. Coal men must spur the search for better mining methods and higher efficiency to provide needed tonnages at lowest cost.

5. With a big stake in the growth of a synthetic-liquid-fuels industry, coal leaders, along with other industrial and business chiefs and federal officials, should continue to support long-range research, private and governmental, by voicing their opinion where it counts most—in their own board meetings, in Congress and in Washington office buildings.

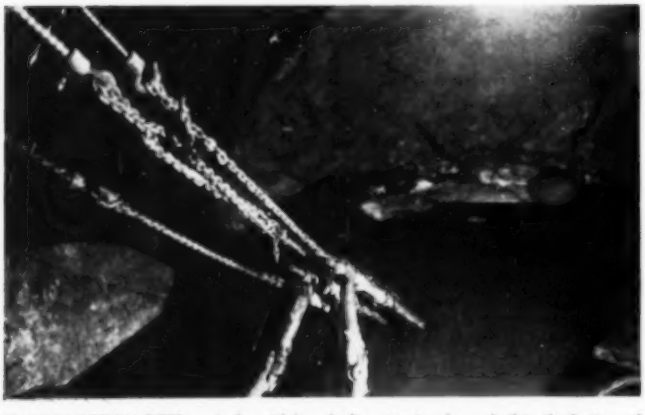
6. Since coal users will keep on boosting their fuel specifications, the coal industry's own research in the use and beneficiation of solid fuel, conducted by Bituminous Coal Research, Inc., and by individual companies, must be kept in high gear.

SEALING CRACKS in the hard blue clay over the water-bearing sand was part of the Alpha solidification job. In these two views of the face of the slope after completion of Sec. 2, the hardened gel shows as white stringers and coatings. Injection pipes appear in the foreground.

Water Stopped in Alpha Slope

Water-Inflow Problem Solved by Chemical Injection to Make Sand Layer Impervious—Joosten Process Employed at Alpha Uses Two Gel-Forming Agents Pumped Into the Strata to Convert It Into a Solid Mass

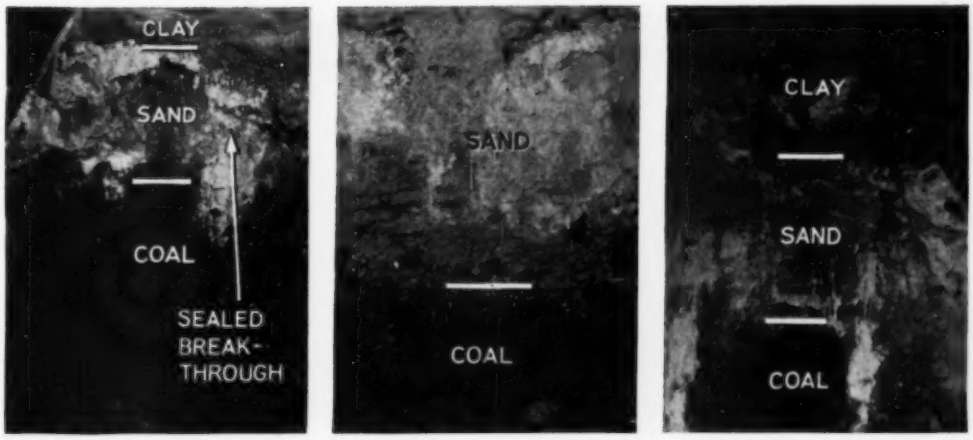
By J. W. JOHNSON
Chief Engineer, Shuler Coal Co., Des Moines, Iowa
And C. MARTIN RIEDEL
Civil Engineer and Partner, Chemical Soil Solidification Co., Chicago



TWIN-INJECTION PIPES ready for withdrawal after stopping heavy boil in the bottom of the slope. Railroad-type high-pressure hose connections are employed.

CHEMICAL SOLIDIFICATION of a loose sand layer was the solution to a water-inflow problem that stopped the sinking of a slope to serve the new mine of the Alpha Coal Co., Alpha, Ill. The sand layer, some 3½ to 4 ft thick, was encountered at a depth of 110 ft below grade, or at a point about 375 ft down in the 614-ft-long 15-deg slope. At this point, a heavy inflow of water under a head of about 50 ft stopped work and forced a search for an economical method of coping with the problem. Through chemical solidification, the water-bearing sand was rendered impervious in the neighborhood of the slope, which then was sunk on down through it without difficulty.

Solidification was based on the Joosten process of chemical soil solidification, named after its inventor, Dr. Hugo Joosten, noted Dutch mining engineer. The process has been used in Europe since 1927 and in the United States since 1940. Unusual and difficult foundation and water-control jobs both here and abroad have included stopping the settlement of buildings and machine foundations, coal tipples, and so on, and raising the bearing capacity of sandy soil up to 900 lb per sq in, or 65 tons per sq ft. The process also is being effectively used to seal leaking cracks and joints in concrete and masonry structures. Even major leaks are stopped by simply drilling holes and



WATER-BEARING SAND after completion of Sec. 4 of chemical solidification. Arrow (left) shows a sealed breakthrough. White patches are solidified gel. Gel-forming chemicals were injected at pressures varying from a normal of 50 to a maximum of 200 lb per sq in.

by Chemical Sand Solidification

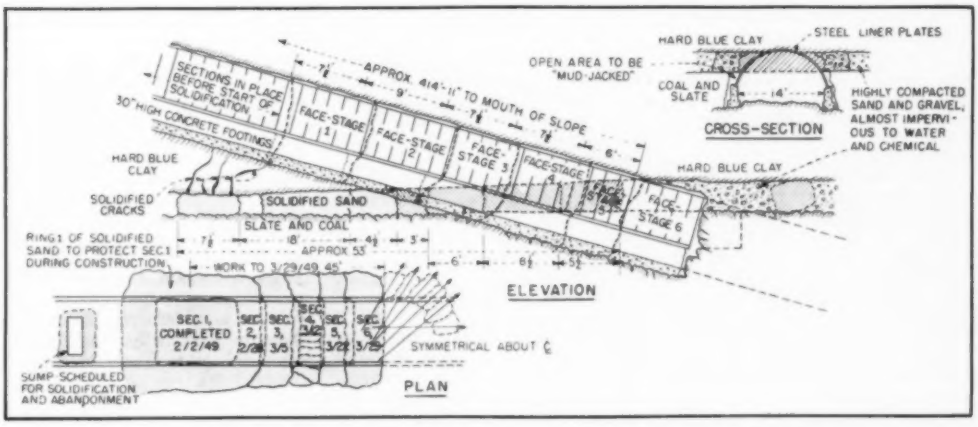
using high-pressure pumps to inject the chemicals.

To solidify sandy soil—either dry or water-bearing—two solutions, (1) a "joostenized" silicate of soda (waterglass) and (2) a reagent (usually a gas or a strong salt solution), are injected consecutively through specially perforated steel pipes, air-driven, of a length depending upon the extent of the material to be treated. The first solution is manufactured by the Philadelphia Quartz Co. and the reagent is furnished by the Solvay Sales Corp. The maximum depth injected, by Riedel and Scully, has been 68 ft.

When the two injected solutions come in contact, a silica-acid gel immediately precipitates and penetrates into the natural strata to form a sandstone-like mass. Its ever-increasing hardness depends upon the percentage of quartz in the sand, the proper balance of gel-forming agents, Chemicals I and II, and other factors. These latter generally can be determined in the laboratory. Incidentally, sand which is too finely-grained or has admixtures of clay and silt to such an extent that water cannot be pumped into it is unsuitable for solidification.

The treated mass is impervious to water. Any acid found in ground water, as, for instance, in slag fills, or any salt water has no detrimental effect on chemically solidified soil. In fact, their presence helps in most instances to accelerate the hardening process.

In the Alpha solidification job, as previously noted, it was necessary to pass through a 3½- to 4-ft layer of water-bearing sand under a head of over 50 ft intersecting the slope



STAGES IN CHEMICAL SOLIDIFICATION for the control of water inflow in the Alpha slope.

MOUTH OF THE ALPHA SLOPE, showing unloading of gel-forming chemical. Mechanical-loading equipment is stored at the left ready for installation.

JOB SUPERVISORS—C. Martin Riedel (left) and J. W. Johnson.

horizontally at a depth of about 110 ft below grade. Solidification of the layer, sandwiched between a hard clay (cracked by blasting) and a layer of coal and slate, appeared to be the only solution.

The first step was solidification of an oblong ring-like area. Then, a number of semi-circles were "knitted" onto the original ring to permit sinking down through the zone of water-bearing sand. At the start of the job, this sand was discovered about 3 ft 3 in below the bottom slab of the slope. The accompanying drawing shows slope details in the sand zone, with the initial solidified enclosure and following protective semi-circles indicated by shading.

The 4x8x13-ft sump shown was dug into the sand layer in an attempt to dewater the sand by pumping before it was decided to go to solidification. The water from this sump was used for jetting, to clean and wash out pipes and pumps and to mix Chemical II at the site. Now the sump has been abandoned after sealing the water out by solidifying a tight ring around it.

The accompanying photos taken in the slope during the solidification work show the sand layer between a top layer of clay and a bottom layer of coal and slate, as well as the hardened white gel forced out of the cracked blue clay. In many instances the gel appeared 5 to 8 ft away.

Driving fan-like rows of injection pipes at angles that had to be accurate to reach specific areas and facilitate knitting them into the preceding ones was not at all easy while going through the hard clay. In going through the solidified material or slate, it was almost impossible in some instances. Where this was the condition, holes were made with rock drills. Since these necessarily were larger than the injection pipes, the pipes were caulked with oakum soaked in Chemicals I and II, using special caulking tools.

Two smaller and one rather heavy breakthroughs occurred at probably inevitable weak points at the outer limits of the semi-circles of solidified sand in the area of the last two sections, where the sand changed to a layer of highly compacted sand and gravel with large sand-and-gravel lenses with a high percentage of voids. However, even the heaviest inflow of water was finally stopped by the quick-setting gel as soon as the emergency pipes driven into the sometimes large holes of the breakthroughs could be spotted and correctly caulked in. Incidentally, it was again found that the smaller leaks, particularly through cracked-up coal and slate, pose greater sealing problems than larger leaks. Where such is the condition, good results have been attained by using specially developed rubber packers with perforations intersecting the water-bearing seams and Y-shaped intake pipes that permit injection of Chemicals I and II at the same time or alternately as necessary.

In addition to the previously mentioned injector packers, two air-driven double-acting piston pumps (Fairbanks-Morse and Gardner-Denver) providing pressures up to 400 lb per sq in were used for pumping the chemicals. The injection pipes are made with perforations either in the point or in the side, and with or without sump at the end. Special inside couplings are necessary with longer pipes to reduce friction while driving or pulling the pipes.

The driving heads, which take the brunt of the hard driving, are especially designed and carefully tempered. A hydraulic double jack with a capacity of about 6 tons is used to pull the injection pipes after the injection is completed. If withdrawal is easy, 1½-ton pull-lifts attached to a clevis fastened to the lining or otherwise anchored are time-savers. Small jetting pipes for washing and cleaning out the injection pipes while in the ground, water pumps, a portable Chemical II mixing plant, heavy pipe wrenches, drilling equipment and special tools complete the equipment.

It should be pointed out in conclusion, as emphasized in previous material, that chemical soil solidification is not a cure-all for all difficult foundation, tunneling or water-control problems. The process is not a competitor of steel sheet piling, cement grouting or concrete construction which, in instances, provide satisfactory results at a lower cost. More than 22 years' experience here and abroad, however, have definitely shown that where ordinary methods have failed or are difficult to apply, the Joosten process has given results provided geological and local conditions are favorable and the process is properly applied.

ROCK LOADING WITH SHOVEL-TYPE EQUIPMENT cuts cost of tunnel work at Newkirk colliery. Three-man crews usually load out a complete cut, filling eight 150-cu ft cars, in approximately 3 hr.

Tunneling at Newkirk

Slant Mining From Rock Tunnels Under the Veins Adopted to Cut Mining Costs and Promote Safety at Newkirk—Shovel-Type Loaders and Mounted Jumbos Selected for Maximum Efficiency in Rock Work

By RUSSELL S. DAVIES, Superintendent, Newkirk Colliery
The Philadelphia & Reading Coal & Iron Co., Tamaqua, Pa.

SLANT MINING of steeply pitching veins is relied upon for maximum economy and safety in anthracite production at the Newkirk Colliery. This property is one of ten P. & R. operations in the southern anthracite field. To achieve the economy and safety previously referred to, it was decided to operate from rock tunnels and, further, to mechanize tunnel driving with mounted jumbos and shovel-type loading machines. As a result of Newkirk experience, the equipment and methods have been extended to other company properties where similar development work is carried on.

Ground was broken for Newkirk, on the outskirts of Tamaqua, Pa., in November, 1942. The main opening is a cross-measure rock tunnel cutting all the veins behind the Buck Mountain. At present, six of these beds, pitching 85 to 90 deg and varying from 6 to 50 ft in thickness, are being mined by the slant method.

The decision to develop in rock at Newkirk was the result of a study of previous P. & R. development methods. Normally, these involved driving gangways and airways in the coal beds. With mining on the advance—the usual practice—maintenance of these openings was difficult and costly as a result of heavy squeezing before the sections could be worked out. Consequently, considerable thought and effort were devoted to development with rock gangways driven underneath the veins to permit mining on the advance through rock holes, thus eliminating the danger of undue weight affecting the production openings.

To start Newkirk, the main

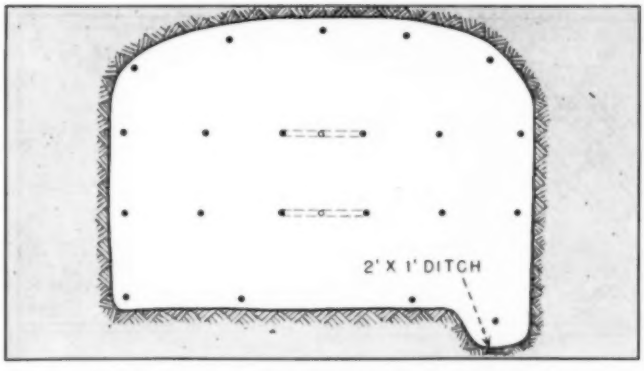
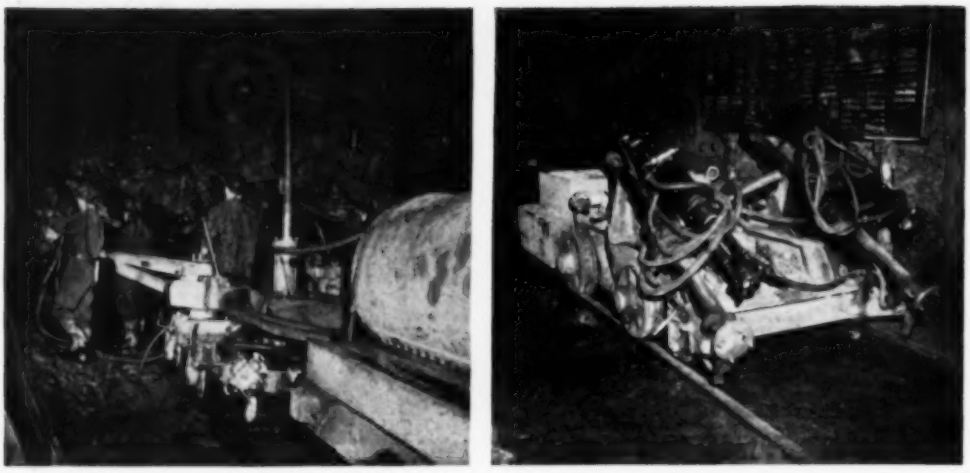


FIG. 1—DRILLING PATTERN for 8x12 face plus ditch at Newkirk.



ROCK-GANGWAY FACE at Newkirk with new jumbo undergoing test. Right is the original jumbo built at the mine.

water-level opening, known as the Newkirk tunnel, was driven straight south 2,240 ft into Sharp Mountain from a valley to the north. From this main opening side tunnels, or rock gangways, are turned east and west off the main tunnel and are driven 25 ft under the beds being worked. Certain of the rock gangways will be 1,800 ft long on one side and 14,000 ft long on the other. Driving of these rock openings was mechanized for two reasons: (a) increased rate of advance, thus assuring a high rate of coal production, and (b) shortage of skilled labor for this type of work.

The first 500 ft of the main tunnel was driven along the line of an old opening approximately 6x8 ft in size, which was driven and abandoned in 1869. This section was widened to 8x20 ft. The remaining 1,740 ft consisted of a new 8x12-ft tunnel to the back of the property. Side tunnels, or rock gangways, also are driven 8x12 ft with a ditch 2 ft wide and 1 ft deep on one side, compared to a 2x4-ft ditch in the main tunnel. To facilitate drainage, the gangways are run on a grade of 0.5% in favor of the water flow.

For loading the rock in tunnel and gangway work, the company selected the Goodman Type 125 Conway shovel, powered by 250-volt dc permissible electrical equipment. As a result of initial experience, a second machine was purchased for Newkirk and four more for other P. & R. mines. For drilling, a mounted jumbo, consisting of two Ingersoll-Rand D.A. 35 drifters mounted on Cleveland columns, was built by the mine staff.

Operating on mine-car trucks, the jumbo mount includes compartments for drilling tools, supplies and accessories. A separate truck was built with a 150-gal water tank for dust control and accompanies the jumbo during the drilling cycle. At this time, also, tests are being run on a Joy-Sullivan mounted jumbo with hydraulic feed. The drills are supplied with air through a 6-in line from a 1,920-cfm Ingersoll-Rand compressor on the surface. Air pressure in the trailer tank forces water to the drills at a line pressure of 80 to 90 lb.

The drilling crew consists of a driller, two helpers and a chargeman. They drill, charge and fire a face round of 21 holes in approximately three hours, shooting with 60% Hercules dynamite and Quick Seal tamping plugs. The normal

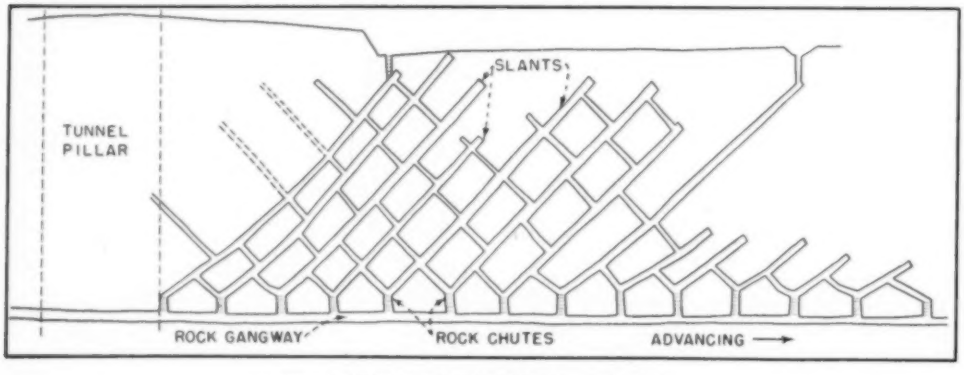


FIG. 2—TYPICAL SLANT MINING from rock chutes.

LOADING COAL from a slant place through a rock chute from a rock gangway.

drilling pattern is shown in Fig. 1. Rib holes are drilled 6½ ft deep; center holes, 8 ft. As shown, two pairs of center holes are drilled together at the back to kick out of the center of the cut and relieve the burden on the others.

Air is circulated to the face and dust and fumes removed in less than 10 min after shooting by a Jeffrey exhaust fan operating through a 2-ft diameter spiral metal duct. Exhaust air goes directly into the return.

A mucking crew consists of three men: boss, shovel operator and helper. They load out a complete cut, filling eight 150-cu ft steel mine cars in approximately 3 hr. The drainage ditch is loaded out along with the other rock from the face. To make this possible, the end sections of the track are raised on ballast as the face advances, permitting the shovel scoop to pick up all the material and completely doing away with hand mucking.

To facilitate car changing and eliminate waiting for empties, a Canton car transfer is employed behind the face. With this transfer a complete trip of enough cars to load out the face can be brought in at one time. The transfer permits an empty to be taken out of the trip and moved ahead of any loads to the shovel. An entire trip frequently can be loaded on a single track without the services of a locomotive by using the Conway to tram the cars past the transfer.

With the crews and facilities as previously outlined, the 2,250 ft of main tunnel and four 100-ft long turnoffs were completed in 400 shifts. In the 8x12-ft section of the tunnel an average of 6½ hr was required for a drilling, charging, shooting and loading cycle.

At the present time approximately 18 ft of rock tunnel is driven daily for a production of around 1,000 tons of coal. Timbering is seldom required, these gangways, like the most of the main-rock tunnel, being left in their natural state after the necessary scaling to remove loose material.

A typical working section at Newkirk is shown in Fig. 2. As stated, the rule is to mine on the advance, taking all the coal in step with gangway advance down to the stumps at the tops of the rock chutes. These rock chutes are driven up from the gangways on pitches of 35 to 40 deg. Their length is 25 to 30 ft; size, 6x8 or 5x9 ft. Two-man crews using stopers do the drilling and the average advance is 4 to 5 ft per shift. The first three cuts are shot down into the gangway and are loaded by a Conway. Then, a battery is built and the remaining cuts are chuted into cars, the flow being controlled by the battery.

The rock holes are driven on 60-ft centers. From the tops of these rock holes slants are driven on an angle of 45 deg up the pitch, with crosscuts at 60-ft intervals. Pillar recovery normally gets under way immediately after enough places are driven so that recovery from one can be kept about 30 ft ahead of recovery in the next. Thereafter, as soon as a slant reaches the gangway or other limit above, pillar extraction usually begins.

The pillar-extraction method is shown diagrammatically in Fig. 3. It consists essentially of slicing off the end in 5-ft lifts by drilling and shooting. Long holes—normally two in the thinner veins—are drilled across the end of the pillar about 5 ft back. A battery is established by placing two or more poles across the legs of the timber set in the slant. Then the lift is shot and the coal is bled off through the battery to a chute alongside the travelway in the slant, down which it runs to the rock chute for loading. When one lift is bled off, the miners drop back about 5 ft and repeat the process.

Slant mining means that the pitches on which men work are cut to only 45 deg even though seam pitch is 85 to 90 deg. Consequently, miners are able to walk up to their work instead of climbing. In addition, miners in adjacent slant places always are protected by solid coal above them.

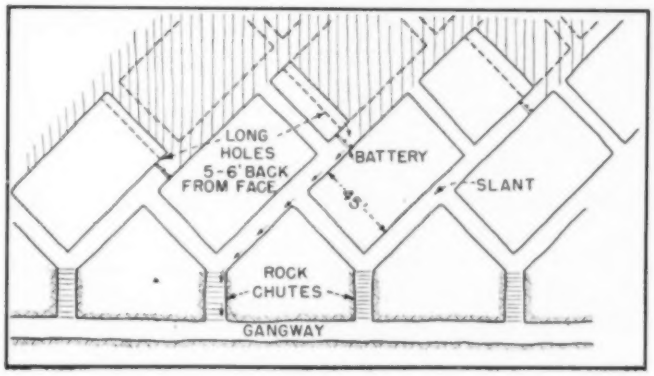
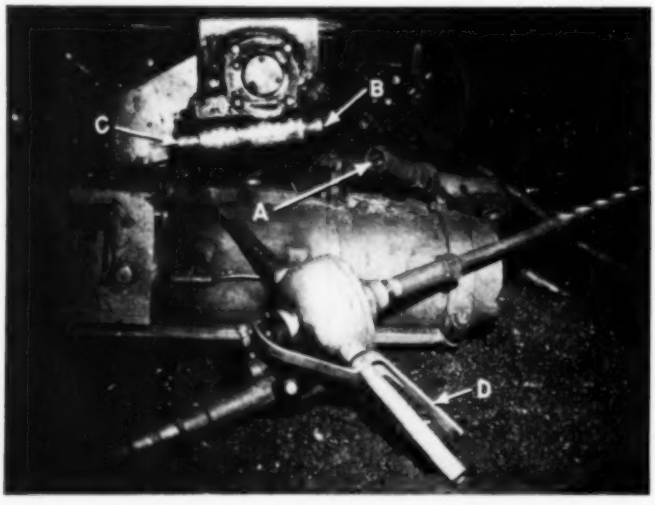


FIG. 3—PILLAR EXTRACTION in Newkirk slant mining.

FACE WORK AT LOGAN NO. 4. While the man at the left is cutting, the one in the center is shoveling bugdust onto the shaker and the man at the right using the flexible-shaft drill powered from the cutting machine is drilling the first hole.

Flexible-Shaft Drilling

Labor Savings and Greater Safety Are Major Advantages in the Use of the New Flexible-Shaft Drive for Drills and Other Face Equipment—Cutting Machines Supply Power Via Special Take-Offs With Snap-On Couplings



END OF FLEXIBLE SHAFT "A" can be snapped onto either the "B" or "C" sides of the power take-off. Drill clutch is engaged only while Lever "D" is pressed toward handle.

FLEXIBLE-SHAFT non-electric coal drills have been used for nearly a year in Logan No. 4 Mine of the Johnstown Coal & Coke Co., Beaverdale, Pa. Labor savings and safer operation are among the several advantages of this innovation in coal drilling.

The seam, the Lower Kittanning, otherwise known as the "B" or Miller, consists of 40 in of clean coal capped by 4 to 6 in of drawslate which, in most places, comes down as the coal is mined. Above the drawslate is a 30-ft stratum of slate. Rooms are driven 18 ft wide on 60-ft centers and 300 ft deep. On the upper side of the entries, rooms are turned straight up the pitch of 8%. On the lower side, they are turned 60 deg so that the grade against the shakers is limited to about 2½%.

The coal is hand-loaded onto the shaker conveyor. Two 5x7-in crossbars are set per 6-ft cut. Although the cover is nearly 1,000 ft over the workings where the accompanying photographs were made, the mine is classed as non-gaseous. Maximum length of section belts is 1,800 ft.

The new coal drills are mechanically powered through flexible shafts from Goodman Type 512 shortwall machines, which are

FLEXIBLE-SHAFT DRILL IN ACTION. Light weight and safety clutches make it a one-man unit. The flexible shaft from the power take-off appears in the right foreground.

equipped with bugdusters. The drill proper, weighing only 30 lb, consists of a strong aluminum case housing speed-reducing gearing and a clutch controlled by a lever on one handle. Because of the light weight and short time required to drill a hole, one man instead of two operates the drill.

Flexible shafts in standard lengths of 20 ft are used in Logan No. 4 mine, although the narrow places driven in this operation do not require that length. The flexible shaft can be attached to either side of the power take-off, which arrangement adapts the unit to mining much wider rooms.

The power take-off, permanently attached to the rear end of the cutting machine, steps the speed up to 3,600 rpm. This therefore becomes the speed of the flexible shaft. Consequently, only a small torque is needed to transmit high power to the coal drill. The flexible shaft is said to have a load capacity of 15 hp. The drill auger operates at 700 to 800 rpm, which is much faster than hand-held electric drills.

The power take-off includes a safety clutch protecting the shaft, gears and driller.

While the flexible shaft itself is only $\frac{3}{4}$ in in diameter, the protective casing, coated with rubber except near the ends, has an outside diameter of 2 in. Attachment of the shaft to the drill head and to the power take-off is by snap couplings, easily and quickly connected and disconnected.

Three men comprise a face crew. When the machine operator is cutting and has progressed about half way across the face, during which time the second man is shoveling bugdust into the shaker conveyor, the third man attaches the flexible shaft to the cutting-machine take-off and begins drilling. If he chooses to put considerable pressure on the drill, he can complete a 6-ft hole in 20 sec or less. The normal time, however, is about 40 sec. Three holes are drilled per cut.

By means of the power take-off and a flexible shaft, auxiliary non-electrical face equipment can be operated from a permissible mining machine. This arrangement, it is pointed out, can be a great advantage in a gaseous mine where nothing but permissible electrical equipment is allowed in the room. Mechanically driven auxiliary items which actually have been operated include gathering pumps, rock dusters, spray pumps, face conveyors, hoists and timber saws.

This new flexible-shaft drill, termed the "Crichton" and now available from the Crichton Co., Equipment Division, 1006 U. S. National Bank Bldg., Johnstown, Pa., resulted from efforts of A. B. Crichton Jr., assistant to the president, Johnstown Coal & Coke Co., to find a cheaper and safer method of drilling. A fatality on a hand-held two-man electrical coal drill in a mine of the company in Nicholas County, West Virginia, where all frame grounding precautions had been taken, spurred the development. Several of the flexible-shaft drills are now used in that mine.

In addition to application on the Goodman Type 512 machines, as shown in the photographs, the take-offs are in use on the Goodman Type 12AA in Johnstown Coal & Coke mines. They are available for various types of Goodman, Jeffrey and Sullivan machines and can be connected to any independent power source.

READY FOR DRILLING THE FIRST HOLE. The machine has cut half way across the face, the flexible shaft has been snapped onto the cutting-machine power take-off.

MEDICAL CENTER, built of concrete block and brick, tops the crest of a small hill. Rear view shows parking area topped with gravel. Heating plant is housed in small room at right. In summer, cool air is circulated for patients' comfort.

New Clinic Serves Coal Area

Private Non-Profit Foundation Builds Medical Center for DeBardeleben Employees and Families—Company Adds to Money Provided by Trust Fund—Clinic Open to Others in Area—Doctor and Nurse Work Full Time

A SHINY NEW CLINIC and medical center for examination and treatment of miners, supervisors, office workers and their families, as well as residents of the area not employed by the company, was opened Feb. 4 by the DeBardeleben Coal Corp., Sipsey, Ala.

DOCTOR'S OFFICE is equipped with examining chair, table and instrument and supply cabinets. Pharmacy is behind doctor's desk.

EMERGENCY ROOM, with operating table, sterilizer, instruments and lamp, is kept ready by Dr. Lovatt and Nurse Watson.

TWIN ENTRANCES lead to twin waiting rooms, each of which adjoins central doctor's office and examining room. Patients wait in sunny rooms, furnished with leather-upholstered chairs. Floors are linoleum tile, which is easy to keep clean.

Located in the center of a wide lawn area, within 200 yd of the doctor's residence, within half a mile of the company's offices and central shop and within 10 miles of the company's most distant operations, including deep mines, strip pits and cleaning plants, the new clinic is staffed by a full-time doctor and a registered nurse.

The building is equipped with all facilities, instruments and drugs needed for out-patient treatment and emergency cases, including two brightly decorated waiting rooms with comfortable chairs and wide windows; a consulting and examining room serving also as the doctor's office and outfitted with medicine and instrument cabinet, examining chair, examining table and sterilizer; an emergency operating room with instruments and cabinet; steam sterilizer, operating table and portable lamp; a pharmacy stocked with all drugs for which any need is anticipated; an X-ray and fluoroscope room for examinations, with an adjoining dark room for developing and studying X-ray photographs; a laboratory for blood and other analyses; a nurse's room; and generous filing-cabinet space. A dentist's room also has been built into the structure and will be equipped in the near future.

X-RAY AND FLUOROSCOPE are used for diagnosis. Dark room is off to left.

Since the clinic, as stated, is set up only for out-patient treatment and emergencies, patients needing hospital care are sent to institutions in nearby Birmingham or elsewhere in the area.

The building is constructed of concrete block and brick. Concrete floors are covered with linoleum tile, a wear-resistant material that also is easy to keep clean. Fluorescent lights, bright colors for walls and attractively designed furniture provide a cheerful yet antiseptic atmosphere. Heat is provided by an automatic coal stoker. Hot air in winter and cool air in summer are circulated by Chrysler Air-Temp equipment to all rooms in the building.

Dr. W. J. Lovett, physician in charge of the new clinic, has been with the DeBardeleben Coal Corp. for 30 years. He is assisted by Mrs. C. D. Watson, registered nurse.

Medical care provided by the clinic and staff is available to employees at a cost of $2 per month for single persons and $2.50 per month for married persons. Membership in the association is voluntary and payments may be made by payroll deduction for those employed by the company. Patients not employed by the company but living in the Sipsey area are treated at the clinic on a private-patient basis that covers the actual cost of their treatment.

Funds for the clinic and its operation were contributed jointly by the DeBardeleben Coal Corp. and the I. N. Hanson Foundation, the latter being a trust bequeathed by the late Mr. Hanson, an original partner in the company and an uncle of H. F. DeBardeleben, now president of the company. Terms of the Hanson legacy stipulate that the fund must be used for the benefit of all residents living within the area of the company's operations and that the clinic must be run on a charitable, non-profit basis. The Hanson Foundation itself owns the clinic building and the grounds. Trustees of the fund are H. F. DeBardeleben, president, DeBardeleben Coal Corp.; N. H. DeBardeleben, executive vice president, and B. T. DeBardeleben.

PREPARATION PLANT'S steel and glass construction means big heat loss and frozen equipment unless warmed in winter.

Heating Mine Buildings

Heat Loss in Tipples and Other Mine Buildings a Costly Problem—Furnace-Fan System Has Strong Merit—Including Heat Plans in Original Design Cuts Cost—Operating and Maintenance Costs Low—Comfort Improved

By MERLE GUTHRIE
Superintendent, Hume-Sinclair Coal Co., Hume, Mo.
And ROGER P. CAMPBELL
Chief Engineer, E. K. Campbell Heating Co., Kansas City, Mo.

IMPROVEMENT TRENDS in any industry frequently bring with them related problems. In the coal mining industry, if such a problem affects continuity of production, maintenance costs and employee working conditions all at the same time, its very nature makes it important that an effective, economical solution be found.

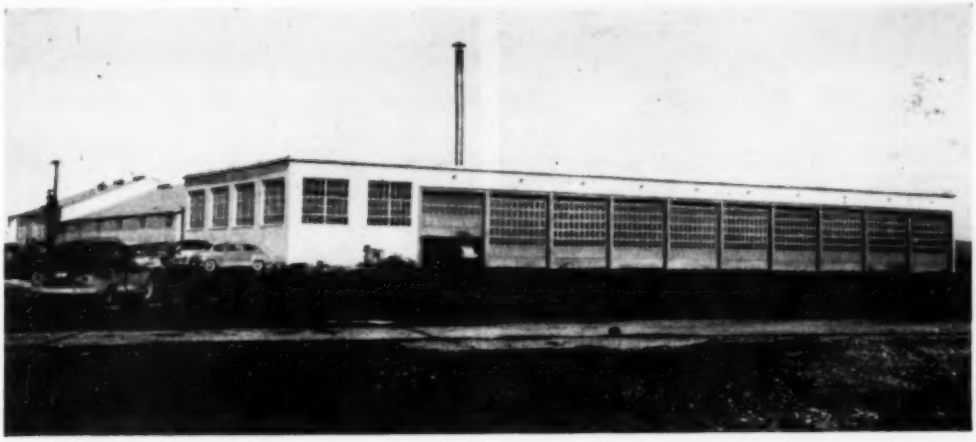
The trend toward wet preparation, combined with rising labor costs and the increasing consideration for employee working conditions, has led to serious need for an economical and adequate method of space heating for preparation plants and mine-service buildings previously equipped with salamanders, spot-heating systems or no heating systems at all.

Recognizing this need some years ago, the Sinclair Coal Co. decided to accept a recommendation by the E. K. Campbell Heating Co., Kansas City, Mo., manufacturers, who specialize in space heating of large structures, for the installation of a heavy-duty furnace fan system in one of their tipples where such a three-pronged problem existed. Protection for machinery, pumps and piping was absolutely necessary and if maintenance and shutdowns due to freeze-up could be completely eliminated, heavy savings would result. Likewise it was expected, though not yet proven, that increased worker efficiency would yield further savings.

One of these early installations for Sinclair Coal Co. was the subject of a paper presented to the American Society of Heating & Ventilating Engineers and reprinted in the ASH&VE *Journal* Section of "Heating, Piping & Air Conditioning," July, 1944, and also in the *Transactions* of that society. Engineering interest in this presentation was due to the unusual heat loss, leakage and building shape encountered and to the new problems arising from trying fully to space-heat a structure of such nature compared with the normal industrial building of tight construction. Suffice it to say here that these initial installations proved that such space heating could be accomplished satisfactorily and with surprising economy in coal tipples, in spite of the unusual problems present. Information on the details, plant layout and results of one of these later installations is offered here, since frequently the experience of others who have solved certain operating problems is a valuable guide in recognizing the possibilities and limitations of equipment that can be applied to fill similar needs.

Perhaps brief mention of the background leading up to this particular installation should be offered before describing in detail the equipment layout and the results obtained from the installation.

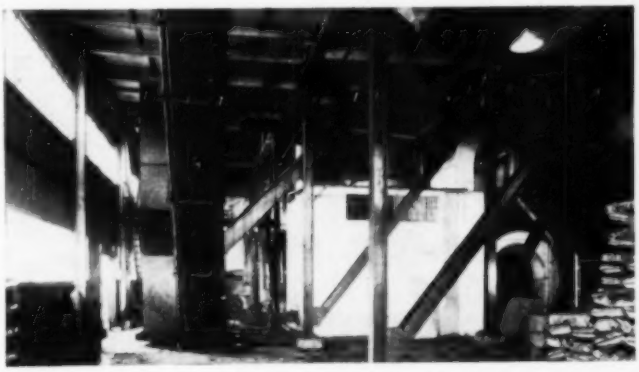
Prior to the equipping of any coal tipples with a heavy-duty furnace-fan system, the E. K. Campbell Heating Co., who manufacture steam as well as warm-air equipment, had furnished some steam equipment to various coal mines for



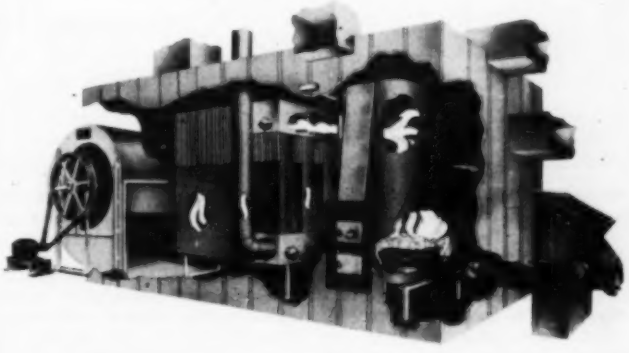
GARAGE-WAREHOUSE-SHOP is built of corrugated steel and concrete block. Heating its open spaces is a complex problem.

use with conventional spot-heating systems. Among the mines so equipped was this particular Sinclair stripping operation, located then at Tiger, Mo. When the mine center shifted to Hume, Mo., as the stripping proceeded southward, and when the new preparation plant and service buildings were erected, the heavy-duty furnace-fan system was selected to heat both of these structures. This selection was based on Sinclair Coal Co.'s operating experience in quite a few similar structures at various mines, where both the new-type space-heating furnace-fan plants and conventional spot-heating steam plants were in constant use. Their experience, based on 19 separate installations of this heavy-duty furnace-fan system made at their various properties, indicated uniformly that adequate installed capacities and satisfactory results could be obtained with this furnace-fan system more economically than was possible with any other type of equipment.

Each tipple or service building has its own individual heat loss, cubic content and distribution needs. These are modified and controlled by the construction materials used, the arrangement of building spaces and the internal interferences affecting air distribution. The Sinclair tipple at Hume is quite exposed and is well removed from the garage-shop-warehouse building, with each building having a complete self-contained heating plant. The tipple is of corrugated iron throughout, fairly compact as tipples go, and has a fairly congested machinery arrangement in-



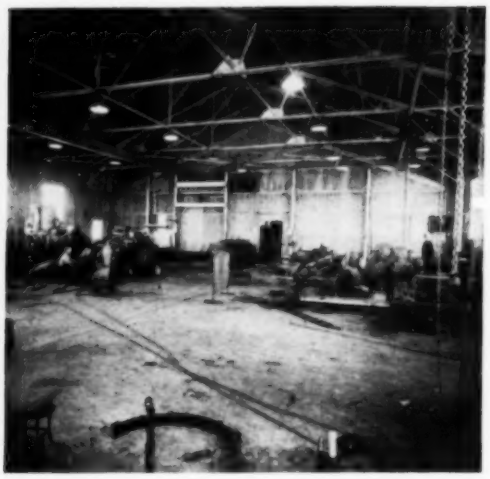
HEATING PLANT in tipple includes stoker, bin, furnace, outlet grill and blower. One duct warms space above tracks.



CUTAWAY MODEL of typical mine-building heating plant shows stoker, firebox, heat exchangers and blower.

How Garage-Shop-Warehouse Is Warmed by a Single Heating Plant

SUPPLY ROOM gets warmth through grill at left center. Return air leaves at floor level. Overhead duct goes to shop.



MACHINE SHOP is warmed by air coming from central blower 150 ft distant. Duct grill is seen at top center.

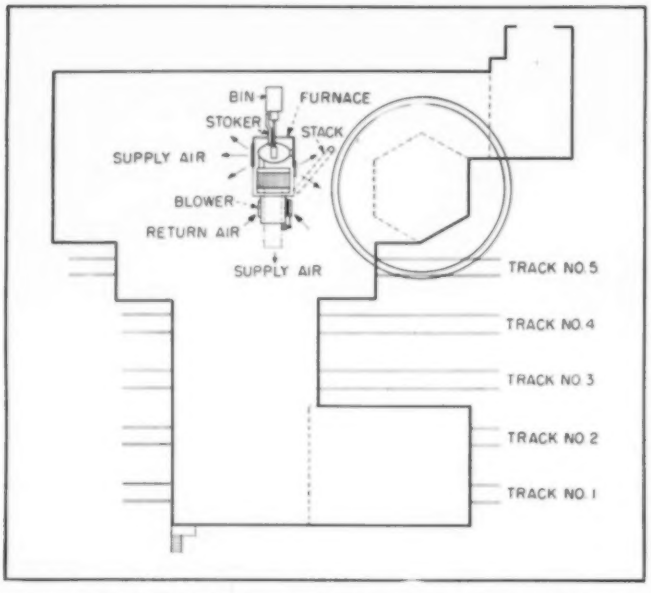


FIG. 1—TIPPLE DESIGN included heating plan from the start. Adapting tipple later for heating plant would have run costs up. A central location to minimize ductwork and the cost of supplying adequate fuel also are factors in the design.

side, typical of average interferences expected in such a plant.

The tipple was designed by McNally Pittsburg Mfg. Corp. and is similar to most modern wet preparation plants in that considerable care was taken to maintain neat appearance inside and out and yet give maximum consideration to the all-important internal machinery arrangement. At the owners' request, McNally Pittsburg included the heavy-duty furnace-fan heating system as an integrated machinery item in the design process and thereby minimized installation costs. To illustrate the point and better to understand the economic importance of proper provision for the heating system, it should be noted that in certain actual cases of tipples of similar size and nature heated with identical basic equipment, the installed plant cost has risen sharply because of complications occurring primarily in the distribution system. From the standpoint of the heating system, the more centrally located it is, in general the more economical will be the first cost. The central location of the heating system in the tipple at Hume (Fig. 1) was provided by McNally Pittsburg in the original machinery plans. Since one of the vital characteristics of a heavy-duty warm-air system as applied to large structures is the movement of large volumes of air to effect distribution, it can readily be seen that complicated ductwork for such volumes rapidly runs into money and is to be avoided wherever it is possible to do so.

Similarly, the cost of providing an adequate fuel supply is simplified if the heating plant and its location are integrated with the rest of the original preparation plant in its design stages. McNally Pittsburg Mfg. Corp. generally provides the fuel supply in their tipples from that part of the flow cycle in the plant which is most economical, considering distance, height, size of coal and possible conveyor or chute costs. In this case, crushed raw coal was available almost directly over the furnace about 50 ft up.

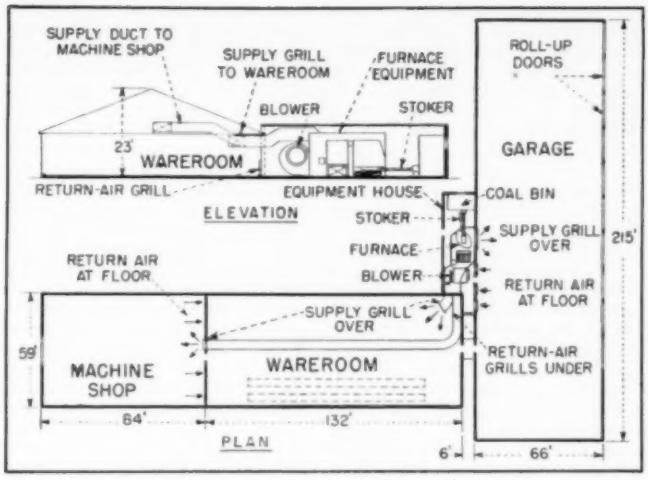


FIG. 2—SERVICE-BUILDING plans, plat and elevation, show how air circulates economically but efficiently through entire area.

Washed screenings also were available. Hence the furnace can and does burn either raw coal or washed screenings, ranging in size from 1½x⅛ to ¼x0 in. Available coal sizes differ a good deal from one mine to another, but in general the burning of the final end product of the tipple is avoided wherever possible for obvious cost reasons. Normally, any size coal from 1½ in down can be handled satisfactorily, but where a nut-and-fines mixture is used, coal under ¼ in should be confined to 40% if possible.

Furnace Sized for Peak Load

For this tipple the estimated maximum heat loss, including leakage, was 5,400,000 Btu per hour and the building content was 326,000 cu ft, showing a ratio of 16.6 to 1. It should be noted that a coal tipple of corrugated iron, unlike normal buildings which have large material masses, lower heat-loss factors and less leakage, actually creates a peak load for the furnace when the heat loss and leakage are at a maximum rate rather than during any heating-up periods. Thus the maximum furnace capacity required is determined by this calculated peak load.

The furnace installed is a single unit having an output capacity of 5,400,000 Btu per hour and is equipped with an underfeed bin-type stoker having a maximum hourly capacity of 605 lb per hour. The blower is of the centrifugal type, being a double-inlet double-width bottom horizontal-discharge, forward-curved blade fan with a 60-in wheel diameter. It is driven by an 1,800 rpm, 440-volt, 20-hp motor to circulate 67,000 cu ft of air per minute through the system and operates at an outlet velocity of 1,800 cfm. A 20-in-diameter stack rises through the tipple roof (Fig. 1).

Tipple Heat Losses High

It might be well to explain that the ratio of heat loss to cubic content in large industrial structures of tight construction and standard building materials in this locality will vary usually somewhere between 3 to 1 and 7 to 1. In coal tipples, however, where corrugated iron usually is the building material and where very heavy leakage can be expected, this ratio usually has been found to vary between 15 to 1 and 25 to 1. From the design standpoint, this heavy ratio of heat loss to cubic content simply means that much larger equipment capacities must be provided than would be the case in a building of similar size and tighter construction. It does not necessarily follow that the cost of the ductwork or distribution system also will be increased, since this is one of the points where proper design and application of this type of system will result in very substantial savings. The ability to distribute effectively very large quantities of heated air without the use of excessive ductwork is in fact the very heart of these systems and is to a certain degree responsible for the low initial costs possible. Further reference to Fig. 1 and to the interior photograph of the tipple will show that the only duct run in this case is one which goes to the over-track of the structure, since it is an isolated cube with severe heat loss, not subject to the general circulation of large volumes of air within the main body of the tipple. Except for this one short run, the distribution system consists of deflecting grills mounted directly in the casing at the furnace. Distribution of heat within the structure has been satisfactory, temperature gradients have been low and no machinery freeze-up or mechanical failures as a result of low temperatures have occurred, although high winds during sub-zero weather have buffeted the tipple, which is in an exposed position.

Flexibility in the furnace equipment which can be selected (relationship of furnace size to fan size) is essential to such a system. This permits moving the volume of air required in accordance with the needs of the individual building and is one reason that unit-type products, such as steam or direct-fired unit heaters, are largely confined to spot heating. Such units are usually furnished capable of delivering a volume of air predesigned on the basis of normal structures. This volume of air is usually much smaller than that used for a well designed tipple job, where the blower is sized with relation to the structure's needs rather than with relation to the Btu output of the furnace. This same flexibility permits operating adjustments when conditions arise that may not have been anticipated in the original design. The ability to make such adjustments is of great importance in obtaining really satisfactory results.

Washed Screenings Used

For the garage-shop-warehouse, the estimated heat load for the entire building was 6,600,000 Btu per hour and the cubic content approximately 560,000 cu ft, showing about a 12 to 1 ratio. This furnace also is a single unit having a capacity equal to the maximum load of 6,600,000 Btu per hour and is equipped with an underfeed bin-type stoker having a maximum capacity of 825 lb per hour of coal. The fuel used is washed screenings, trucked from the tipple nearby to an enclosed bin. The blower is a centrifugal type, forward-curved blade fan, double-inlet double-width

bottom horizontal discharge, with a wheel diameter of 66 in. It is driven by an 1,800 rpm, 440-volt, 25-hp motor at a speed of 175 rpm circulating 81,500 cu ft of air per minute through the system, and operates at an outlet velocity of approximately 1,900 cfm. A 24-in-diameter stack rises well above the building.

The distribution system in this building, which is cut into sections by full partitions, involves more ductwork than is in the tipple. However, only enough ductwork was used to reach each of the three major rooms with an outlet of sufficient size (Fig. 2) and again there is practically no distributing ductwork within the various spaces being heated. Distribution within the spaces is fundamentally accomplished by moving sufficient volumes of air, since the same volume that is being forced into each space at its diffusing outlets is also being removed from the space as return air at the floor level. The result of removing such volumes from the cold zone normally present at the floor is literally to pull the heated air down to the occupied zone at the floor level. There are, of course, limitations to this in application, but with sufficient experience in the distribution of air in large spaces in this manner, such limitations can be easily spotted in advance and provided for in the design of the system as applied to any given structure.

Building Materials Differ

The garage-shop-warehouse building presents an unusual problem in several respects. The garage portion, where large trucks are stored and serviced, is of semi-permanent cinder-block construction while the other wing, containing the warehouse and shop, is of typical semi-portable corrugated-iron construction. The use of corrugated iron makes such structures semi-portable when a stripping operation moves to new locations, but it needs larger heating equipment than semi-permanent construction. Where the coal will be worked out in a reasonable number of years, most operators prefer the semi-portable type for obvious reasons, while those whose operation is tied to one location for a very long period of years frequently use the semi-permanent structures.

When the two types are combined into one structure like this, however, certain heating complications arise. For instance, even though the entire building can be maintained with reasonably uniform temperatures during the operation of the plant, it can be assumed that when the heating system shuts down (the blower, specifically), the rate of cooling off in the iron building will exceed the rate of temperature drop in the cinder-block wing of the structure. This condition has been noticed in the actual operation and while it is not desirable, it has not been severe enough to be considered particularly objectionable. Were the building used for office workers instead of industrial and shop purposes, it would be necessary to zone it or otherwise care for the unbalance created by the differences in construction materials in the two wings of the structure. The thermostat operating the system is located in the warehouse adjacent to the return-air grill and consequently is subject to the fluctuations of the colder part of the structure.

In the garage section, use of the large doors when trucks enter or leave has only a brief effect on the temperature of the space after the doors are once closed again. This is because of the inherent characteristic of such a system as this, which enables it to move very large volumes of air back across the heating surfaces of the furnace in a relatively short period of time.

Considering the entire building, every cubic foot of air in all three sections—the garage, the warehouse, and the machine shop—moves back across the furnace once every $6\frac{3}{4}$ minutes. Since this all moves from the floor level, it readily can be seen why problems involving structures with large doors or heavy leakage problems are especially adapted for economical use of this type of system. The same basic explanation applies to any large space, where smaller volumes of air in motion lead to heavy temperature gradients, which in turn yield high ceiling temperatures, high fuel bills and cold floors.

Advance Planning Cuts Cost

Whether located at a strip mine, shaft mine, drift, slope mine or elsewhere, this type of system is applicable to most surface structures of large proportions. Proper advance preparation and consideration of the heating problem would reduce initial costs in most cases of this kind, even where the equipment is not actually installed at the time the building is erected. It has been found, for example, that the most desirable location for the furnace equipment, for maximum economy of initial cost, minimum operating cost and minimum interferences in an "L" shaped building of the type at Hume-Sinclair, is generally in the crotch of the structure (Fig. 2). Similarly in a tipple, the system usually is most economical if located adjacent to or in the center of the main "load" sections of the building. Under these conditions, ductwork can be minimized and in many cases eliminated entirely, simplifying distribution system costs and interferences.

However, if little thought is devoted to the matter in the planning stage, frequently interferences are created that could just as easily be avoided. It should be interesting to note that even today, with huge sums being invested by the industry in preparation plants and service facilities, there are many cases where the heating of these buildings is left to afterthought. The amount of planning and capital that go into efforts to reduce coal production costs is enormous, but all too frequently this effort is confined to the preparation machinery itself.

Machine Location a Factor

Knowledge of the limitations surrounding the application and use of any equipment is frequently as valuable as the knowledge of its strong points. Thus, it might be pointed out that where a space is highly subdivided by fully airtight partitions, air circulation, which is a very necessary part of a furnace-fan system, becomes more expensive in proportion to the amount of subdivision. Machinery interferences such as exist in a tipple are definitely not included in this class, since they are not airtight enough to prevent air circulation. Such machinery interferences must be allowed for, however, in designing the velocity, size and location of air-distribution outlets.

Return-air circulation offers much less concern ordinarily, since the cold mass of air invariably will collect at the lowest possible levels. Frequently severe leakage or exhaust loads, when concentrated, can be partitioned within a tipple; for example, where the full-length upswinging type loading booms are used. Various other means are used for handling remote refuse bins subject to freezing, exposed wet conveyor runs and similar problems, depending upon the processing needs of the plant involved and on the economic merits of the rela-

tive alternate methods. Frequently such areas can be handled very economically directly from the furnace but occasionally other provisions are also required. In regard to these isolated areas, it should be recognized that general statements are dangerous, since each problem has its own requirements and only adequate heating experience with them can protect against troubles.

Possibly the space heating of such structures seems far removed from the question of employee relations, but working conditions which are unsatisfactory can be troublesome as well as costly. The bituminous industry alone had a payroll of over $1,500,000,000 in 1947. In some mines, the entire investment occasionally is tied up or jeopardized because of poor employee relations. Everywhere there is evidence that progressive managements realize that a genuine interest in the welfare of the employee is as important to long-term operations as production-cost figures are. Sinclair Coal Co. long ago recognized the effectiveness of real consideration for its employees. Consistent adherence to this policy is one of the factors responsible for the company's steady and rapid growth. It is difficult to measure improved employee relations, but actual figures indicate that adequate heat in these buildings has resulted in reduced absenteeism, less time lost by employees trying to get warm and increased efficiency. Such payroll savings will justify the cost of a heating system even in buildings where the mechanical freeze-up problems of the wet tipple do not exist.

Working Conditions Improved

Certain men in any mining operation undergo long training or apprenticeship which often is expensive to the company. To jeopardize the investment so created by forgetting the importance of his working conditions to the individual employee has proved costly to some companies and will continue as a heavy expense to any operating company so inclined.

While discussing the human element, it might be mentioned that Hume-Sinclair and others have found that these heavy-duty furnace-fan systems are subject to less trouble from the human element than other types of plants because their simple automatic controls are not subject to much tinkering, because there is no possibility of freezing condensate lines when operating fluctuations occur, because a sizable pressure vessel with its attendant restrictions is eliminated and because less time and skill are required to service the fire and heating system.

Operating Costs Low

Hume-Sinclair has found that operating and maintenance costs for these systems are very low. Very little maintenance has been required and such routine items as have required attention have been very low in cost compared with repairs to any other system capable of similar work. The fuel consumption of both plants is economical, considering the spaces to be heated. Fuel economy results in part from the inherent air-circulation characteristics of this type of system. Moving the entire air supply for the system from the lowest level in the structure prevents cold floors and excessive temperature gradients, which in turn mean poor temperature distribution within the space and high fuel consumption. Operating costs are benefited further by the fact that this equipment was specifically designed for burning coal and by the fact that fundamental over-all efficiencies attainable are invariably greater with a warm-air system than with steam. Every component of a warm-air plant, including the stack and the electric motors, becomes an auxiliary to the furnace.

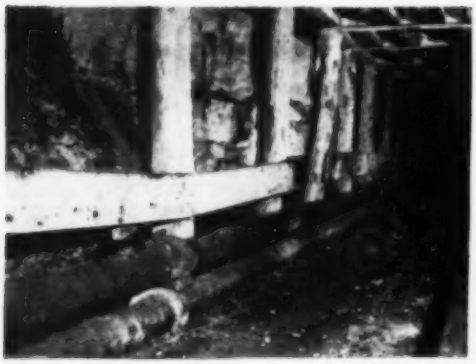
As for initial costs, it can be shown in every case where one of these systems has been applied to coal-mine work that the installed cost is substantially lower than that of any other type of system with an equivalent output capacity. Where relocation of mine buildings and equipment is necessary, the heavy central equipment is 100% salvageable, making it adaptable to the corrugated-iron "transient" type of building. Some of the ductwork and grills may not be reusable under such circumstances, but since this is ordinarily a small part of the system, it does not become important.

It is generally recognized that repeat business in this type of work is an excellent indicator of actual users' opinion, based on their own operating experience. It can be noted that coal producers who already have used this system go consistently to these heavy-duty furnace-fan systems for all of their additional large structures where it is applicable, unless reasonably adequate equipment from some other operation already is owned. No exceptions to this are known to date. This high degree of repeat installations is in itself a gauge of the economic cost and the results obtainable with this type of system when properly applied.

Results from the operation of these two heavy-duty furnace-fan systems have shown several points of interest. Initial and operating costs have proved to be satisfactory over considerable periods of time. Results from the standpoint of space heating, machinery protection and, where it is a consideration, human comfort have been satisfactory. Operating time and skills required are sufficiently reduced to permit men who have other duties to operate the systems, eliminating the need for stationary engineers where statutes so require. No difficulties from the standpoint of equipment operation have occurred that have not been easily, inexpensively and rapidly taken care of. Maintenance is generally confined to lubricating the blower and stoker motors and cleaning the fire. No indication of the ultimate equipment life is yet apparent, since this application has been confined to the last decade. However, identical equipment by the same manufacturer in services and buildings that are similar has shown a life expectancy roughly equivalent to that of a steam boiler under similar operating conditions, with maximums at present of 39 years and ultimate possible life unknown.

System Proves Successful

Some, whose experience does not include any contact with this type of space heating in large structures, have been doubtful of or have openly challenged the possibility of heating large coal tipples with this type of system. In many cases, lack of a complicated distribution system confuses such persons still further. The fact remains that this basic method of heating has been successful for several decades in the heating of all types of large industrial structures and for the last decade in the heating of those tipples and service buildings where it has been installed. When properly applied, it can produce better results and furnish more basic capacity and consistently lower initial, operating and maintenance costs than any other type of system. The day probably is not far distant when a truly adequate heating system will be recognized as a vital part of the production machinery at practically every mine surface building.



THE FIRST OF THESE TWO 25,000-ft. 6-in. invasion-pipe water lines employing a special coupling system was laid in a week to avert a shutdown of the central washing plant at Consolidation Coal Co. (Ky.). Three men coupled nearly 1,000 ft. per shift.

FULL-FLOW TEES, such as this serving a 2-in. connection, are installed at 500-ft. intervals for sprinkling and fire fighting. Valves now available have external grooves instead of internal threads, thus eliminating the adapter shown here.

Pipe Installation Speeded

Grooved-Pipe Couplings and Fittings Speed Installation Underground and Permit Pipe Bending and Re-Use Without Straightening at Consol (Ky.)—Five Miles of 6-In. Pipe Laid in a Week Prevents Washing-Plant Shutdown

NO TIME IS LOST by the Consolidation Coal Co. (Ky.), Jenkins, Ky., in adopting a new material or method that will raise efficiency and lower cost either directly or indirectly. Standardization on Victaulic pipe couplings and fittings for surface and underground use is an outstanding example of the management's interest in better operating equipment. In less than 2½ years the company has installed many miles of pipelines equipped with these fittings.

Pipe used with Victaulic fittings has no threads. Instead, the pipe employs an annular groove of a depth less than that of a thread, into which a bolted gasket housing fits to prevent the joint pulling apart. The flexibility of the molded gasket and the floating fit of the key section of the housing into the pipe groove provides flexibility to absorb misalignment, expansion and contraction. The one-piece gasket, molded of a rubber-like compound and equipped with an inclined tip angle for automatic sealing tension, is squeezed only moderately when the parts of the housing are bolted together. Oval-neck-type housing bolts prevent turning during tightening of the nuts. For pipe sizes from ¾ to 14 in., the housing is in two parts and requires only two bolts.

Although the Victaulic system is relatively new in the coal industry,

TWO 4-IN. LINES, one regularly in use and the other a spare, take sludge from the washing plant to a settling pond 700 ft. away.

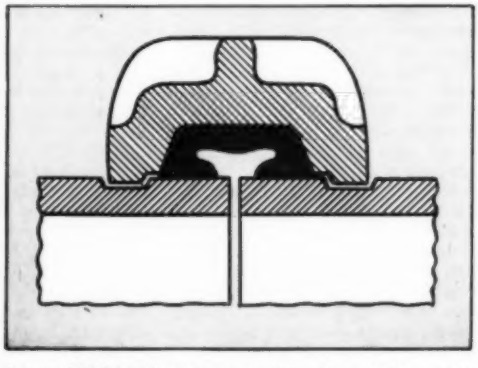
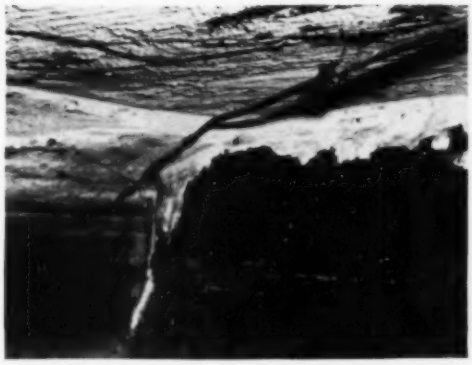


FIG. 1—PIPE-COUPLING housing confining the gasket for a leak-proof joint also fits into pipe grooves to lock the joints.



WITH THIS RECENTLY ADOPTED coupling system, ¾-in. sprinkler pipe can be bent to fit the contour of the roof and need not be straightened for moving or re-use. Pipe is suspended by copper wire held in the roof by a wooden plug.

THE START of a 5,600-ft. 2 in. distribution line connecting to 1,400-ft. of ¾-in. spray piping in the working places at Consol, both employing the new coupling system. A 3-hp. 10-gpm. 200-ft.-head spray pump is shown at the lower left.

it was conceived during World War I as the "Victory Joint" and took its name from the two words, victory and hydraulic. Countless miles of Victaulic pipe were used in World War II.

The first Victaulic pipe application at Consolidation Coal Co. (Ky.) occurred in December, 1946, and consisted of a hurried installation of 700 ft. of 4-in. pipe from the Central Preparation Plant, Dunham, Ky., to a sludge pond. The speed with which the line was completed, using a minimum number of bends and fittings to follow the ground contour, was convincing evidence to the company of the adaptability of Victaulic pipe to mining jobs.

Piping Follows Roof Contours

The possibility of its application to the ¾-in. spray piping installed in working places to allay dust was immediately recognized and in April, 1947, such installations were initiated in Mine No. 207 at Dunham. The water lines are suspended from the roof and, since the pipe lengths do not have to be straightened for re-use, there is no hesitancy in bending them to the roof contour. Since every joint is a union joint, crooked pipes need not be rotated, as is necessary with screw joints for ordinary couplings.

Use of Victaulic fittings next was extended to the 2-in. lines serving as feeders to the ¾-in. pipes. For the most part, these supply lines are suspended from the roof. To provide overhead support for the lines, a 1½-in. hole 8 in. deep is drilled in the roof, three hairpin-shaped bare copper wires are placed over the upper end of a tapered wooden plug, and the plug is driven into the hole. Then, after the free ends of the wires are looped around the pipe, they are twisted together. The wires are cut from scrapped rail bonds or stranded feeder cable. Average spacing of the suspensions is 10 ft.

In applying the Victaulic coupling system to underground use at this early stage, the company was hampered by the unavailability of 2-in. and ¾-in. valves with Victaulic grooves. As a result, adapters had to be purchased or made up in the shop. Now, a complete line of Victaulic valves and fittings, including solid elbows, adjustable elbows and tees, is available and pipe manufacturers supply pipe with grooves instead of threads. Also, portable tools and attachments for pipe-threading machines to groove new or used pipe on the job may be obtained. Standard grooving permits a 4-in. pipeline to be deflected 2 deg. 2 min. at each joint. The deflection is greater for smaller sizes and less for the larger.

Two 5-mile parallel lines of 6-in. Victaulic pipe are now in operation underground in the connected mines: No. 207, Dunham, and No. 214, McRoberts. The need for the first 5-mile line arose in the summer of 1947 when, because of dry weather, the water supply for the Central Preparation Plant at Dunham dwindled to a critical point. Although an 8-in. line was desired for this long run to bring water from McRoberts, only 6-in. 700-lb. tested invasion steel pipe grooved for Victaulic couplings was readily available. The 5 miles of this pipe were installed in a week. Once the 20-ft. lengths had been distributed along the haulageway, three men connected nearly 1,000 ft. of piping per shift.

Pressure at the pump discharging through this line is 301 lb. To provide hose connections for wetting down roadways or fire fighting, either 2-in. or ¾-in. taps and valves were placed on the line at 500-ft. intervals. Last November, a second 6-in. 5-mile Victaulic line of invasion pipe paralleling the first line was completed.

Sprinkler Taps Standard

Sprinkler taps on all water lines now is standard in all mines of the Consolidation Coal Co. (Ky.) and every mine, including Winters and Clover Splint, in Harlan County, and No. 155 at Van Lear, in Johnson County, has some of the Victaulic pipe.

In accordance with a policy of providing a reserve pipeline for all lines handling water, sand, sludge, etc., at the Central Preparation Plant, a second 4-in. Victaulic line has been installed from the plant to the sludge pond on the hill. Victaulic pipe has been found especially suited to pumping of refuse because: (1) clogging is minimized, since the closely butting pipe ends present a relatively smooth surface; (2) a length can be removed for cleaning or replacement without disturbing adjoining lengths; and (3) a pipe that wears from abrasion on the inside bottom can be easily rotated a quarter or half a turn to prolong its life.

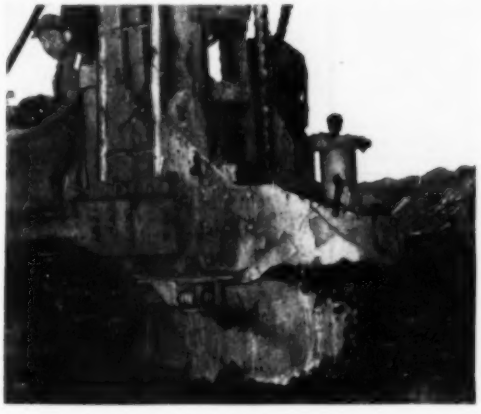
Strip-Mining Safety Is Target as Men and Management Work Together

SHOW-HOW TEACHING points out the right way to stack crossties and the safe way to set brakes on railroad cars.

AUTOMATIC DERAIL FLAG helps keep safety record good. Outdoor scoreboard shows record at a glance.

BULLETIN-BOARD POSTERS, changed often, urge men to wear safety shoes and hard hats and keep goggles clean.

SAFETY MEETINGS, sparked by films and safe-practice demonstrations, teach know-how and build teamwork among workers.



EMPLOYEES' SUGGESTIONS produced safety skirt for pinning machine and remote unloading valves for butane.

Strip-Pit Safety

Management and Workers Team Up to Improve Safety —Group Competition Keeps Interest High—Worker Suggestions and Fast Follow-Through by Management a Big Factor—More Tons Mined as Safety Improves

By F. J. FORESMAN, Personnel Director
Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.

AN ACCIDENT-PREVENTION program started three years ago by the Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., has produced results that add further proof to the slogan, "Safety Pays." The program, carried on through the whole-hearted cooperation of management and labor, has resulted in a decrease in lost-time accidents, better personnel relations and a substantial reduction in compensation-insurance premiums paid out.

Although the Pittsburg & Midway Coal Mining Co. always has endeavored to make its mines safe and has encouraged safe working practices among its employees since it first began coal-mining operations in 1885, it was not until Jan. 1, 1946, that a coordinated accident-prevention program was set up under the supervision of a safety director.

To develop a program that would be applicable to the scattered and varied operations of strip mining, a survey was made of accident-prevention programs of other mining companies, industrial plants, insurance companies and the U. S. Bu-

Inspections, Worker Suggestions and Company Follow-Up Boost Safety

THE PITTSBURG AND MIDWAY COAL MINING COMPANY
SAFETY INSPECTION REPORT

ITEM	Satisfactory	Unsatisfactory	ITEM	Satisfactory	Unsatisfactory
I. BUILDINGS & GROUNDS			q. Grinding Equipment	Fair	
a. Floors & Platforms			r. Welding Equipment		
b. Stairs & Handrails	Fair		s. Mechanical Saws		
c. Ladders	Fair		t. Steel Cables	Fair	
d. Aisleways			u. Clamps		
e. Material Storage			v. Chains & Hooks		
f. Entrances & Exits			w. Hand Tools	Good	
g. Maintenance			x. Layout		
h. Housekeeping	Fair		y. Safety Devices		
i. Fire Protection	Good		z. Housekeeping	Fair	
1. Extinguishers			III. SAFETY EQUIPMENT	Good	
2. Hoses	Fair		a. Goggles	Good	
3. Inflammable Liquid Storage			b. Face Shields	Good	
4. Heating Equipment			c. Safety Shoes		
5. Exits			d. Safety Hats	Yes	
6. Signs			e. Gloves	Yes	
j. Health & Hygiene			f. Hot Sticks	Good	
1. Lighting	Fair		g. De-Rollers		
2. Ventilation			h. Warning Signals		
3. Heating			i. First Aid Supplies	Good	
4. Drinking Water			IV. ROLLING EQUIPMENT (R.R. Cars, Locomotives, Trucks, Tractors, etc.)		
5. Toilets			a. Maintenance		
II. MACHINERY & EQUIPMENT			b. Operation		
a. V-Belt Drives Guarded			c. Brakes		
b. Chain Drives Guarded			d. R.R. Tracks		
c. Gears Guarded	Good		e. R.R. Switches		
d. Flywheels Guarded			f. R.R. Crossings		
e. Belts & Pulleys Guarded			g. Yard Clearance		
f. Wiring			h. Material Storage		
g. Switches			i. Safety Devices		
h. Disconnects			j. Housekeeping		
i. Electrical Grounds			V. PERSONAL		
j. Power Cables	Good		a. Safety Rules Enforced		
k. Conveyors			b. Employee Cooperation		
l. Stairways	Good		c. Safety Devices Used		
m. Handrails	Good		d. Conduct (no horseplay or scuffling)		
n. Maintenance			e. Attitude		
o. Explosives Storage					
p. Oiling Set-Up					

Make detailed report below of items checked "Unsatisfactory". If additional space is required use other side of page.

REMARKS:

need handhold on dipper stick up by trip motor and on side of bucket

Date Dec 30 1948 Report made by Clarence a Johnson

Form SI 3-46

INSPECTION REPORT notes need of hand-holds on dipper stick and bucket.

reau of Mines. After a careful study of the various programs, a plan was developed that the company's management believed would best meet the needs of the many movable and changing kinds of work involved in strip mining. Since the success of any safety program depends to a great extent on the cooperation of all employees, the plan was set up so that eventually every employee would have a personal responsibility in helping administer the program.

The organizational set-up that was developed consists essentially of two committees, the Central Safety Committee and the Safety Sponsor Committee. The Central Safety Committee is composed of top management, foremen and supervisors. It is the policy-making group and it is the duty of this committee to determine and establish safety rules and regulations, to hold at least one meeting every month to review accidents and to determine what action should be taken on safety recommendations made by safety sponsors, foremen or supervisors to eliminate hazards and improve the safety program.

The Safety Sponsor Committee consists of the safety sponsors from all the divisions of the company's combined operations. A safety sponsor is an employee chosen from his division to serve on the committee for a period of three months. Each sponsor is elected by his fellow workmen in his particular division. No man is eligible to serve more than one term until all the other men have served a term on the committee.

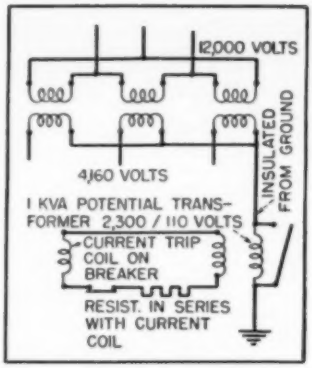

12,000 VOLTS
INSULATED FROM GROUND
4160 VOLTS
1 KVA POTENTIAL TRANSFORMER 2,300 / 110 VOLTS
CURRENT TRIP COIL ON BREAKER
RESIST. IN SERIES WITH CURRENT COIL

FIG. 1—Potential ground relay system makes pit cables safe.

As much as possible, group divisions are made up of employees working in the same area or engaged in the same classification of work. This system makes inspections easier and more efficient and groups together men whose work hazards are more or less similar.

Personnel of open-pit operations are divided into three groups, as follows: (1) excavating, (2) loading and (3) field, hopper and maintenance. Preparation-plant personnel are divided into six groups: (1) machine shop, (2) electric shop, (3) washery and tipple, (4) tipple ground crew, (5) locomotive crew and (6) section crew. Two open-pit operations and one plant make a combined Safety Sponsor Committee of twelve members.

It is the duty of the sponsors to make an inspection of their divisions once a week; be on the alert at all times for hazards; report to the safety director, supervisor or Central Safety Committee all unsafe physical conditions that are observed personally or pointed out by their fellow workmen; caution workmen doing work in an unsafe manner; investigate every accident, no matter how minor, that occurs in their division for cause and send a report to the Central Safety Committee; and attend the monthly meeting of the Central Safety Committee.

To simplify inspections, the sponsors are provided with a form on which they have only to check whether conditions or equipment

are "Satisfactory" or "Unsatisfactory." Space also is provided on the form for any remarks the sponsor might like to make.

Joint monthly meetings, held by the Central Safety Committee and the Safety Sponsor Committee, provide the sponsors, foremen and supervisors an opportunity to discuss safety problems with top management and present safety recommendations. The committee determines what action should be taken on these recommendations. Lists of approved recommendations, signed by the general superintendent and sent to the respective supervisors, grant the authority to do the recommended work. When the work is completed, the lists are signed by the supervisors and returned to the safety director. If the lists are not returned within 15 days, the safety director makes a follow-up. On recommendations requiring immediate attention, the follow-up is made at once.

All recommendations are given careful consideration. Letters of explanation are written to those employees whose recommendations the committee did not believe to be practicable or feasible or on which there might be delayed action.

The number of recommendations received since the start of the program indicates the cooperation of the entire personnel in accident prevention. Here are a few examples:

"Install protective skirt on pinning machine to guard men against flying pieces of coal and dirt as weight hits coal."

"Install 100 ft of pipe to intake valves of butane storage tank so that the trucks that unload into our storage tank will be a safe distance away from the tank in case the pump on the truck becomes overheated."

"Move high switch stands on main run-around switches to give brakeman more clearance."

"Install some protective device alongside or under refuse belt to protect tipple groundman from falling chunks."

"Install brace under eccentric arms of classifying shaker so that if arm should break loose, brace would prevent arm from falling."

Because many hazardous conditions and unsafe working practices already have been eliminated, the number of suggestions received naturally has diminished somewhat since the first year. However, recommendations and suggestions still are received each month as conditions arise that warrant attention.

Form 33 3-48 — Safety Department

THE PITTSBURG & MIDWAY COAL MINING COMPANY
SAFETY RECOMMENDATIONS

Date Issued Dec 30, 1947
Date Rel'd. 1-15 1948

To Emil Sanderson:

PLEASE HAVE THE FOLLOWING UNSAFE CONDITIONS CORRECTED:

1. Repair step at field hopper that truck drivers use to step on swinging boards. At present time drivers are jumping from platform steps to truck fender which might result in a fall and serious injury.
2. Weld the rod on the dust hopper that oiler uses for a hand hold. At present time one end is loose.
3. Check the gage and vapor valve of butane storage tank. At present time liquid comes out of vapor valve before gage shows the tank is 70% full.

Please sign and return to Safety Department within fifteen days, indicating below what disposition was made of recommendations.

F J Foresman
Safety Department

Recommendations Followed (✓) — Work Completed Nos. 1 and 2.
Work Not Completed (✓) — For Following Reason: #3 Storage tank must be empty. Arrangement will be made with Oklahoma Butane Co. to have fuel truck on hand when tank is empty. At present the storage tank shows 47% Will notify when corrected.

Copy of this recommendation is on file in the Safety Department. The Safety Department is instructed to send a detailed list of all unapproved recommendations more than fifteen days old to the General Superintendent the first of each period.

(Signed) General Superintendent

WORK SLIP ORDERS hand-holds and provides for check-up and follow-through.

Management energetically and enthusiastically promotes accident prevention. Physical hazards in the preparation plant and shops, such as gears, belt drives and chain drives, are carefully guarded. All walkways are provided with proper railings. Machine shops are provided with boxes in which to place broken or worn-out tools so they may be repaired or discarded. Greases and inflammable liquids are stored in fireproof buildings according to the provisions of the Federal Mine Safety Code. Convenient steps and railings are placed on all excavating machinery. Pit highwalls are trimmed and sloped to prevent slides and rolling rocks or dirt. All equipment and conditions are checked for possible hazards by the safety director, who coordinates the entire program.

One of the major hazards involved in strip mining is the handling and maintenance of high-voltage power cables that are necessary to operate the large excavating and loading equipment. Pittsburg & Midway's chief engineer, H. J. Garrison, with the cooperation of the Kansas Gas & Electric Co., has developed a potential ground relay system (Fig. 1) that provides maximum ground protection. A four-wire shielded power cable, together with a four-wire line, provides a ground copper return from the machines to the substation. If any one of the wires in the cables supplying current to the machines becomes grounded, the voltage is transmitted through the ground wire to the primary coil of the kva potential transformer. This current sets up a current in the secondary coil, which in turn sets up a current in the current-trip coil, thus breaking the circuit. Even a small moisture leak will cause the circuit to open.

Cable splicing and all other electrical jobs are done only by the staff of the electrical department

and under the supervision of the chief engineer. An electrician assigned to the maintenance of excavating and loading equipment is on call 24 hours a day.

Explosives for shooting bank and rock are stored in a permanent magazine several miles from mining operations. Bank shots to loosen the overburden are made with 3x24-in 40% Gel. A supply sufficient only to load the horizontal drill holes is transported from the magazine to the pit. Shooting is done after the loading shift has finished and the crew has left the operations. Rock overlying the coal is shot with 1x1⅛-in 40% Gel or 1¾-in pellet. A minimum supply is stored in a pit operation magazine. Explosives and caps are transported from the pit magazine in separate wooden boxes with covers. Shots are charged and fired only by authorized persons.

Workers Wear Safety Gear

Employees are encouraged to wear personal protective equipment wherever and whenever needed. Goggles and hard hats are provided free of charge. Prescription safety glasses are available through the safety department at a nominal cost, which is made even less by the credit allowed the purchaser equal to the pair of regular safety goggles that would have been issued. Many employees who wear glasses take advantage of this offer. Goggle-cleaning stations consisting of cleaning fluid, tissues and mirror are maintained in the shops so that goggles may be quickly and easily cleaned (*Coal Age*, April, 1949, p. 116).

Warm liners to be worn under hard hats during the winter are provided. Safety shoes may be purchased from the company at cost. Although safety shoes are not sold in the storeroom, arrangements have been made with a supplier for obtaining shoes within four days after the order has been received. Management does not make it mandatory to wear safety shoes, but the protection they provide is stressed at every safety meeting and a majority of employees do wear them.

Safety meetings are held at each of the three operations every month, generally following the end of the first shift and always on company time. Demonstrations are given and sound movies and strip films are shown covering such subjects as handling material, personal protective equipment, traffic hazards, home safety, fire protection and proper use of fire extinguishers, hand tools, power tools and other items. Safety engineers from other companies and representatives of the Kansas State Mine Inspection Department and the Pittsburg fire department have been invited to speak at the meetings. One meeting last summer was a "family night." Employees and their families from all operations gathered on the lawn of the mine office for a talk on home safety, movies and a watermelon feed.

At every safety meeting, the record is reviewed and accidents that occurred during previous months are discussed. All employees are encouraged to take part in the discussion and to make suggestions.

Additional reminders of safety are bulletin boards and safety signs scattered over the operations. Large lost-time bulletin boards, 8x10 ft, are located at each unit to keep employees informed about lost-time accidents in each division, in each unit and in combined operations. Bulletin boards erected especially for safety posters are located at strategic points. Posters pertinent to the location of the several boards are posted weekly. Safety-slogan signs are scattered throughout the operations, but safety-caution signs are placed only where required by hazardous operations or conditions.

Contest Winners Honored

To help maintain employee interest in accident prevention, a contest is conducted each year among the company's three operations, Mine No. 18, Mine No. 15 and the central cleaning plant. Men of the winning operation receive a certificate and a smorgasbord dinner. The interest with which the employees look forward to the dinner assists considerably in promoting safety.

In addition, a similar dinner is given each year for all employees who serve as safety sponsors. The dinner is sponsored by the company's insurance carrier, the Bituminous Casualty Corp., who through its chief engineer, C. F. Sheader, cooperates closely with the company in promoting the safety program. Joint inspections are made by the company's safety director and Mr. Sheader, who occasionally appears on the program at safety meetings.

The company's employee publications, *The Strip Pitter*, devotes one page entirely to safety news and items. The page contains a column of "Safety Slants" written by the safety director, the cumulative safety record, the names of safety sponsors, pictures of safety equipment, pictures of places around the job worthy of recognition for good housekeeping, pictures of individuals who have done outstanding work in safety and other news and photos. This means of presenting safety hints and problems to employees is more satisfactory than safety folders or bulletins because *The Strip Pitter* contains other news of the company and its personnel.

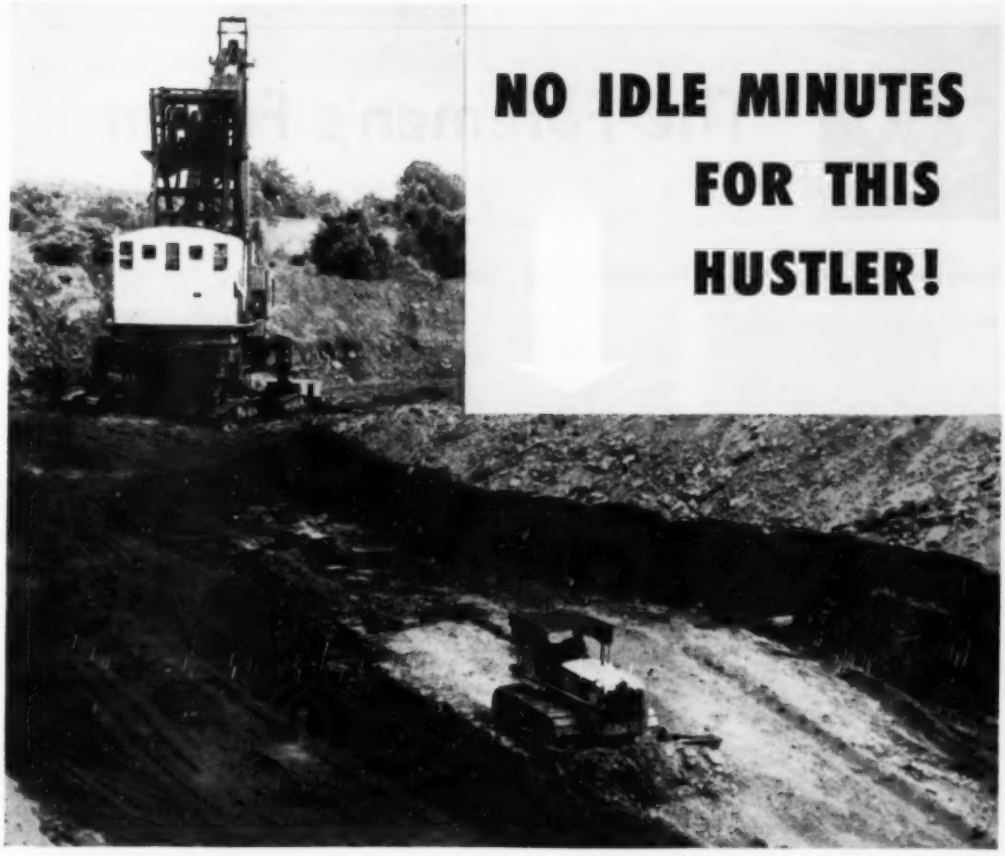
As a further stimulant for accident prevention, Mine No. 15 and Mine No. 18 were entered in the "Sentinels for Safety" contest sponsored by the U. S. Bureau of Mines so that employees would have an incentive to work toward a record worthy of national recognition. That goal was attained in 1947, when Mine No. 18 was awarded a Certificate of Achievement by the Bureau in open-pit group competition for having worked a full year totaling 127,871 man-hours without a lost-time accident.

Employee Relations Improved

The results accomplished by the safety program have been encouraging. Although it is difficult to evaluate the intangible accomplishments, definite tangible gains that can be measured have been made. Accident frequency and severity rates have been reduced, compensation-insurance premiums have been substantially lowered and better personnel relations have been developed. Through the program, employees have come to the realization that safety is a personal responsibility as well as a responsibility for management. Likewise, it is significant that gains were made in production at the same time accident frequency and severity rates were reduced.

The management of Pittsburg & Midway Coal Mining Co. realizes the truth of the safety slogan, "The Best Safety Device Known Is a Safe Worker," and it is toward the end of making and keeping all employees safety conscious that the program is planned and administered. Management hopes to attain that end by maintaining continued interest of the employees in the program through safety meetings, contests, first-aid and accident-prevention courses, a follow-through on all safety recommendations and suggestions, and by conscientiously doing its part in eliminating as many work hazards as possible and promoting safety education.

NO IDLE MINUTES FOR THIS HUSTLER!



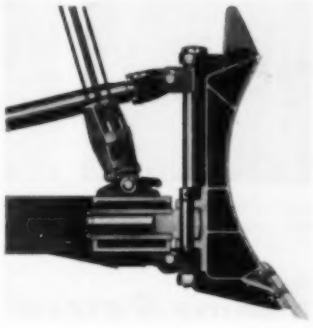
Matched "Caterpillar" equipment gets a job done faster! Price of a standard "Caterpillar" D8 Tractor is $12,650; No. 8A Bulldozer, $2370; No. 25 Cable Control, $1430 (F.O.B. Peoria, prices subject to change without notice).

You can't afford weak sisters around a mine. Every unit has to do a man's job—and the more jobs it can do, the better. That's why more and more outfits are using the "Top Dog of the 'Dozers"—a "Caterpillar" 'Dozer.

Here's a "Caterpillar" No. 8A Bulldozer matched with a "Caterpillar" Diesel D8 Tractor busy on an operation in Warwick County, Ind. Quoting Mr. M. Bowner of the Tecumseh Coal Corporation: "Our 'Caterpillar' 'Dozer is one of the most useful tools we have around the mine." Here it is cleaning up (the coal vein has been taken out) to prepare the ground for loading shovel and trucks. Two of its many other jobs include stripping overburden and building haul roads.

"Caterpillar" Bulldozers and Cable Controls can also be used to advantage on other machines. If you have a replacement problem, the best solution is "Caterpillar." Get the down-to-earth facts from your "Caterpillar" dealer—he's as close as your phone.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



"Caterpillar" angling Bulldozer

1 Blade curvature, based on 40 years of "Caterpillar" experience in grader blade design, *rolls* materials ahead for bigger loads.

2 Longer life in every blade! "Caterpillar" pays up to 30% premium for the high tensile steels that go into its 'Dozers.

3 Angling and tilt adjustments are only a matter of seconds for one man.

4 Box beam sections for rigidity and strength.

CATERPILLAR DIESEL

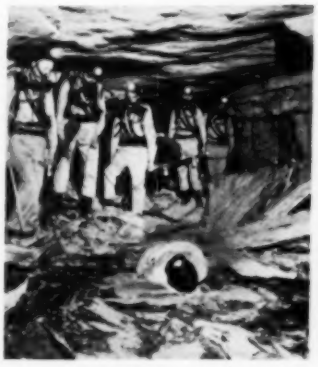
REG. U. S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

The Foremen's Forum

Simulated Underground Problems Play Important Part in . . .

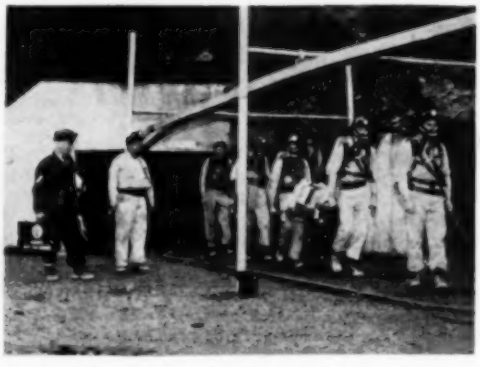
1. AT FRESH AIR BASE, rescue team first studies mine map for location of a miner "felled by gas."



2. CONNECTED by a lifeline to prevent being separated from each other, team members reach "unconscious man."

3. AS THE FIRST STEP at the accident, team member determines by prescribed tests whether victim is alive.

4. FOUND ALIVE, miner is placed on stretcher, given first aid and a breathing apparatus, before the trip to the surface.



5. FOLLOWING THE LINEMAN, team brings miner to the portal, where further first aid necessary is given him.

Keeping a Mine-Rescue Team on Its Toes

PREPAREDNESS is the watchword in any well-organized and effective mine-safety program—preparedness that makes it second nature for any individual miner, mine official, first-aid or mine-rescue teams to do the right thing the instant disaster strikes.

While safe practices, equipment and machinery and continuous training and education of all personnel in the prevention of accidents are essential in management's never-ending drive for increased mine safety, no program is complete unless adequate provision is made to handle any contingency that may arise. All the safety precautions you may take and the training you give your men in safe working habits may be meaningless when something happens if there is no one at hand sufficiently experienced and trained to step in and take over.

To make a preparedness program

B. F. Goodrich announces new all-nylon tire

Now B. F. Goodrich announces an all-nylon tire for strip coal mining equipment. Again B. F. Goodrich is first with a money-saving development.

Nylon is extra strong and elastic. Size for size, nylon cord is twice as strong as the cord generally used in tires. Since the new BFG nylon tires have the same number of plies as other tires, you can see that cord body strength is greatly increased. These tires have over twice the bruise resistance and many times the flex life of other cord tires.

The new nylon tires (with the tread design shown above) have been tested on some of the toughest operations in the country, including coal mining. In all of the tests, *not a single tire blew out and not one flex break occurred!*

Even with nylon cord B. F. Goodrich uses weftless construction. This means there are no cross-threads; cord tension is controlled and equalized. Tire growth is reduced; tires last longer.

Nylon tires will provide big savings for strip-mining, quarry and other operations where heavy loads and rough terrain have made tire costs high.

The new all-nylon construction is typical of the continuous improvements being made in truck tires by B. F. Goodrich. Long ago, BFG engineers developed special types of tires for coal mining service. They constantly developed new improvements. One of these was the nylon shock shield, a major construction advancement now used in all B. F. Goodrich truck tires with 8 or more plies (double nylon shock shield in large off-the-road tires) — including the new, all-nylon tire.

For more information on how B. F. Goodrich nylon tires can do more work for you and save you money, see the BFG Dealer or write us direct. *The B. F. Goodrich Company, Akron, Ohio.*

Times Haven't Changed

The following ballad, entitled "The Wonderful Dream," was written especially for COAL AGE by Berton Braley and was published in the issue of June 6, 1914.

Weary with project and plan and scheme
The manager slept and dreamed a dream
Of a noble Stranger who bade him, "Come,
And I'll show you a mine that is GOING SOME!"
So away they flew through the ambient air
Till they came to a spot exceeding fair,
And there they gazed on a handsome mine
Where everything seemed to gleam and shine,
Where hoist, compressor and breaker, too,
Were big and busy and neat and new
And all the workers with smiling faces
Were doing their best in their proper places.

Into the deep shaft's yawning crater
They dropped in a cage like an elevator
And through the whole mine's great extent
The manager and the Stranger went.

The air was bracing and pure and cool.
There wasn't a sign of a horse or mule.
Electric motors performed the work
Which they had done in the dark and murk.
Each miner toiled with a right good will
And his cars stood ready for him to fill.
There was no hurry, no heat nor waste.
The miners toiled with a skill most deft
And when they were through there was no coal left.
The guide explained as they went their way
That the miners lived to be old and gray
And died at ninety or more, he said,
With the sorrowing family round the bed!

He added, "This is a fact, I vow,
There's never a strike or a labor row."
The manager wiped his throbbing brow,
"Say, where is this mine?" he loudly cried.
"In Heaven, of course," replied the guide.

The manager woke and from bed he sprung,
For the telephone bell had loudly rung.
He put the instrument to his ear
And this is the message he had to hear:
"Hello! Hello! The pumps are clogged,
The lower workings are water-logged,
And the hoist is broke and the fan won't go,
And the breaker's stopped 'cause the steam's too low,
And the shaft is filling with mud and muck,
And—hello there! The men have struck!"

really pay out, you must have management support and enthusiasm for it—all the way up the line to the "top brass." That means management must realize its importance and be willing to show that it does by providing proper equipment and facilities, endorsing the objectives and backing up the training of individuals and teams. Many companies, for example, promote first-aid training for all employees, sponsor intra-company competition among teams and of course go all out to support regional and state team competition.

Once you've got management backing, the necessary equipment and the interest of the men, it's a question of training and practice—and more training and practice—to make individuals and organized teams letter-perfect in the handling of any emergency. Simulated problems, carried out under actual mine conditions, constitute just one of the advanced technics that may be used to make a team program effective. In addition to providing training in a particular type of case, simulated problems increase the men's experience in working under emergency conditions, spark team members' interest in the work and keep them on their toes for competition with other teams.

For example, in the photographs above, reprinted from the company's publication, *Republic Reports*, members of the 1948 Kentucky State Championship Mine Rescue Team from the Republic mine of the Republic Steel Corp., Pike County, Kentucky, are shown at work on the simulated rescue of a miner "felled by gas"—a part of the training that helped make the team the state champions. Officials and team members, as shown in Photo No. 1, are: H. C. Elkins (left), safety supervisor; J. C. Coyer, mine foreman; Edward Rowe, team captain; Charles Collins, map man; Delmar McPeak and Elihu Coyer, stretcher bearers; and Elmer Layne, lineman.

•

Higher Costs Show Need for Less Waste

How important is it for a foreman to keep a close watch on supplies and materials?

Pointing out that the cost of nearly all items used in coal mining has gone up, *The Safety Commentator*, published for employees by The Hudson Coal Co., Scranton, Pa., recently printed the following. It's a safe bet that every coal company in the country could tell much the same story. Here it is:

"You and your wife know that it takes a lot more money to fill your market basket than it did in 1939.

"You have company. Below are some of the price increases The Hudson Coal Co. has had to pay since that year:

"Props have increased 3c per lineal foot. We use almost 7,000,000 lineal feet per year, so the prop bill has gone up about $210,000.

"Mine ties have increased 27c apiece and since we use 135,000 a year, the bill for ties is about $36,540 higher.

"Hardwood timber has gone up $33.50 per 1,000 board feet. Over 1,000,000 board feet which we use means $33,500 more than in 1939.

"Shaker chute pans are about $2 apiece higher than in 1939. Five thousand a year means $10,000.

"Shaker chute bolts, 15,000 of them a year, are 20c apiece higher. That boosts the bill $3,000.

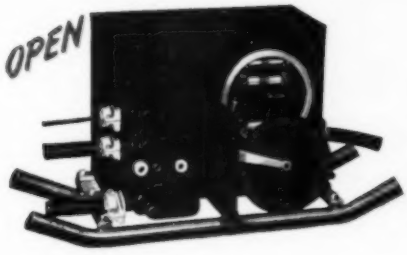
"Track spikes are about 5c per lb. higher than in '39. Using 44,000 lb. a year means $2,200 increase.

"Three-quarter-inch pipe has gone up 2c a foot. For the 80,000 ft we use we have to pay $1,600 more.

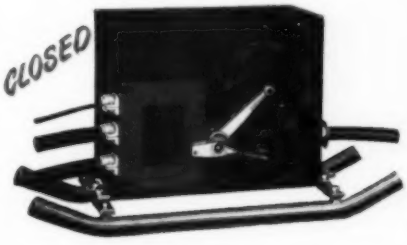
"And brattice cloth!—We use around 150,000 sq yd a year and it has gone up 14c per sq yd. That's $21,000.

"When you realize that these are only a few of the items our purchasing department handles, you can readily see that you aren't the only sufferer from high prices. Also, you might help out by taking good care of the company's property. One hand should watch the other."

Fool-Proof Interlock Prevents Opening O-B Distribution Boxes with Power "On"



It can't be opened with power "on." When the disconnect switch is closed, the position of the operating handle prevents access to either plug box or fuse compartment.



Safety is made an integral part of O-B Permissible Distribution Boxes. Because of an ingenious interlocking arrangement, branch circuits can be plugged into the boxes only when the power is off. Fuse compartments, as well, cannot be opened unless the incoming power circuit is broken. There's no chance for loss of memory—only with the disconnect switch **opened** can access be gained to the inside compartments of the box.

Play safe . . . protect your workmen and your tonnage . . . use O-B Permissible Distribution Boxes at the face and other locations requiring several individual power circuits. Employing reliable cartridge fuse protection, O-B boxes are available with connection facilities for either two or three branch circuits. For complete engineering data, fill out and mail the attached coupon today.

3614-M

Ohio Brass

MANSFIELD, OHIO, U. S. A.

Please send complete engineering data and catalog information on O-B Permissible Distribution Boxes.

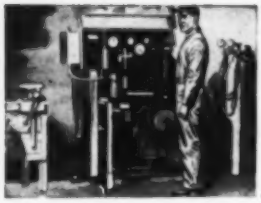
Name .....

Company ..... Title or Dept. .....

Address .....

City ..... Zone .... State .....

(Canadian Ohio Brass Co. Ltd., Niagara Falls, Ont.)



Operating Ideas

Face Marked to Facilitate Smooth Top Cutting

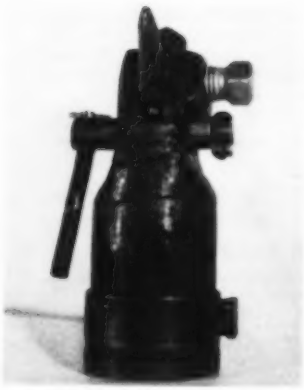
AMONG THE ADVANTAGES of cutting a smooth top are speedier and more effective timbering, a safer working place and the conservation of coal. To facilitate cutting a smooth top in Mine No. 25, Consolidation Coal Co. (W. Va.), Clarksburg, W. Va., a member of the cutting crew first places guide marks at the proper height along the face.

The height is measured from the mine bottom, thus assuring a cut parallel to the bottom, which is better than cutting a level kerf. Generally, the Pittsburgh No. 8 seam dips only 1 to 3%. Marking is done with whiting and a small brush and consists only of an intermittent line of a few dashes.

In development work in this mine, 7½ ft of the 8½-ft seam is taken, while in pillar work cutting usually is closer to the roof so as to recover as much coal as possible. A Sullivan 10RU rubber-tired unit is employed for cutting.

TO PROVIDE A SMOOTH ROOF, top-cutting will follow these marks placed at a uniform distance from the bottom.

Jack-Pipe Head Boosts Cutter Safety



SAFETY HEAD FOR JACK PIPE adds safety, speed and ease to cutting-machine operation.

A MOLDED STEEL SAFETY HEAD for a cutting-machine jack pipe makes it unnecessary to dig jack holes in the roof, prevents jack pipes from flying out, with possible injury to workers, and saves time, according to its inventor, James C. Buttrick, fireboss, Kaymoor mine, New River & Pocahontas Consolidated Coal Co., Kaymoor, W. Va.

The safety head, shown in the accompanying photograph, operates with two set screws, the top one adjusting the bit and the one on the side tightening the bit. The small lever on the side is connected to an eccentric shaft that goes through the head. An ordinary machine bit rests on a flat place on the shaft. Fitting on the end of a conventional jack pipe, the safety head takes the place of the pig foot usually made on the end of the pipe. Stressing the convenience of the safety head, Mr. Buttrick points out, for example, that if a jack pipe is tight when the helper starts to take it down, all he has to do is loosen the set screw and turn the lever to loosen the bit.

Since it is not necessary to dig a hole in the roof with a pick to set a jack when the safety head is used, a good deal of time is saved. Likewise, because the safety head permits setting jack pipes at greater angles, the cutter need not carry so many jack pipes. One machine operator, for example, states that his cutter now carries only two jack pipes, instead of the seven it carried before the safety head was used. In addition, use of the safety head eliminates the dust caused by digging roof holes and thus improves working conditions. No cases of jack pipes flying out have been reported during its use.

The safety head now is being manufactured by the Advance Machine Co., Beckley, W. Va. Its price is quoted at $25.

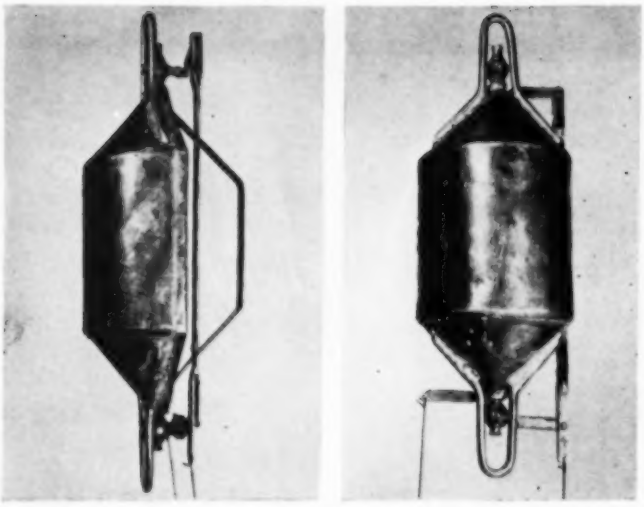
OVER 250,000 FEET NOW RENDERING SATISFACTORY SERVICE

- **KING KOAL underground CONVEYOR BELTING was developed and is being manufactured by Hamilton Rubber Mfg. Corp., to keep pace with the advent of underground conveyor belt systems.**
- **In every KING KOAL BELT is incorporated the essential qualities for economical conveying of coal with the positive assurance of long and uninterrupted service.**
- **For the ultimate in coal mine conveyor belting, specify KING KOAL CONVEYOR BELTS by**

We will gladly submit a sample upon request.

ADVANTAGES

- **Resists severe impact . . .**
- **High tensile strength**
- **Flexibility**
- **Troughs easily**
- **Won't gouge easily**
- **Mildew-proof, won't rot**
- **Excellent for long and short hauls, also slope**
- **Runs true on idlers**
- **Unaffected by mine acids or alkalies**



COPPER AIR-SAMPLE BOTTLE built in the Providence shop of The Hudson Coal Co. is mechanically operated by lines from the surface to speedily obtain air samples from the bottom of a borehole.

Copper Air-Sample Bottle Facilitates Borehole Tests

A MECHANICALLY OPERATED copper air-sample bottle, designed and built by the staff of the Providence repair shop of The Hudson Coal Co., Scranton, Pa., has solved the problem of quickly securing air samples from boreholes for chemical analysis.

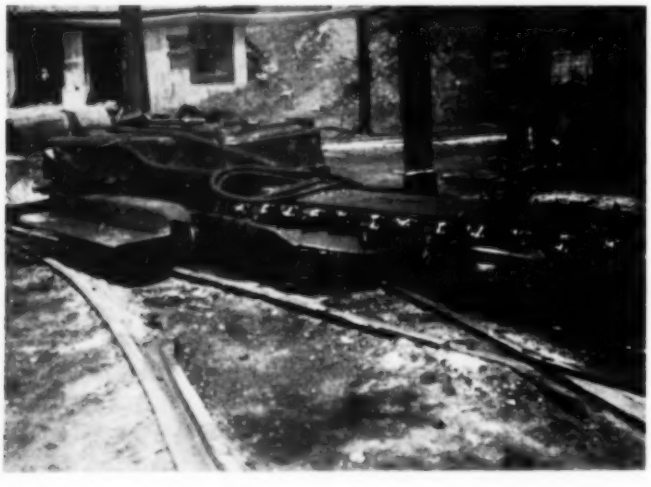
The need for such a device first arose when it became necessary to obtain air samples from a borehole near the company's Powderly colliery to check the possible presence of a mine fire in a location that could not be reached in any other manner. A sampling bottle borrowed from the U. S. Bureau of Mines by John D. Cooner, safety director, proved effective but was found somewhat cumbersome since it was operated by lowering a vacuum bottle, breaking the tip of the bottle within the borehole and then sealing the bottle.

As a result, the problem of a simpler device for making the tests was taken by Warren L. Shirey, ventilation inspector, to Donald N. Smith, shop superintendent, who put it before Daniel Hartzell, blacksmith shop foreman. Mr. Hartzell worked with Edward Shumann, electric repairman, and John Roszko, sheet-metal worker, to produce the bottle shown here.

The copper bottle, as illustrated, is filled with water, sealed by petcocks at both ends and lowered into the borehole. At the proper depth, a line attached to an arm opening the petcocks is pulled to permit the water to run from the bottle and draw in air from the borehole. Once the water has run out, which takes by test a time of 2 min 14 sec, a line attached to the opposite arm is pulled from the surface to close the petcocks and seal the sample. The entire assembly then is brought to the surface, disconnected from the lines and sent to the chemical laboratory for analysis. A weight attached to the bottom of the bottle prevents it from being drawn up when the petcocks are operated.

When the copper bottle designed in the Providence shop was first tested, it was found to provide the same results obtained from the device borrowed from the Bureau of Mines and all air samples have been secured with the shop-built bottle since that time. Use of the copper bottle has been found to materially cut the time required for an analysis report.

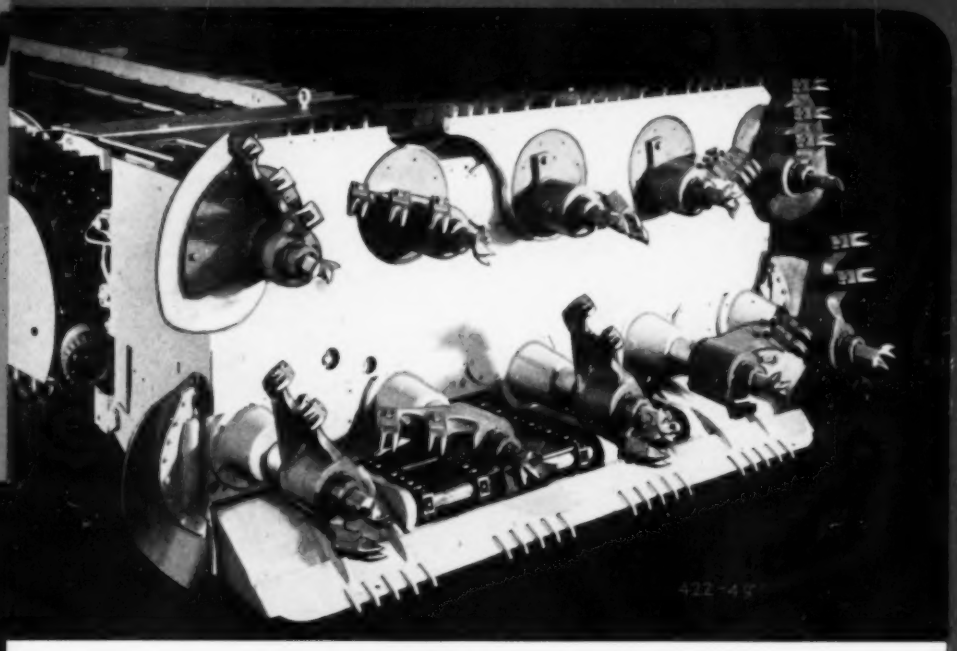
Seat Built for Cutting-Machine Helper



CUTTING-MACHINE HELPER'S SEAT eliminates cutter-bar riding and adds to safety when using old-type machines

A SHOP-BUILT SEAT for the machine helper on an old-type cutting machine has been provided at some operations of the Lillybrook Coal Co., Beckley, W. Va. Until the seat was installed, a helper usually rode on the cutter-bar—a somewhat dangerous place at best. Now, with the new-type seat installed, as shown in the accompanying photograph, there is no good reason for the helper to ride on the cutter-bar, since he has been provided with a safer and more comfortable spot.

The COLMOL



26-Ton Giant Ready To Go To Work

They came — they saw — they were amazed. Visitors to the recent Coal Mining Exposition saw the COLMOL in action — saw motion pictures taken during actual digging and loading operations at the mine. Needless to say this NEW mobile continuous mining machine stole the show — operators were enthusiastic about it.

Yes, the enthusiasm was far beyond anything we had anticipated and it can be best expressed in one operator's comment:

> "What a machine! It really does a neat job of cutting and loading simultaneously without drilling and shooting — and fast. A great advance in both mechanization and safety."

NOW — production is under way and the mechanical 'mole' will soon be ready to go to work for YOU. Turn the page for additional details about this one-process device.

The COLMOL COMPANY is Formed to Utilize Jeffrey's Facilities to Produce New Unit

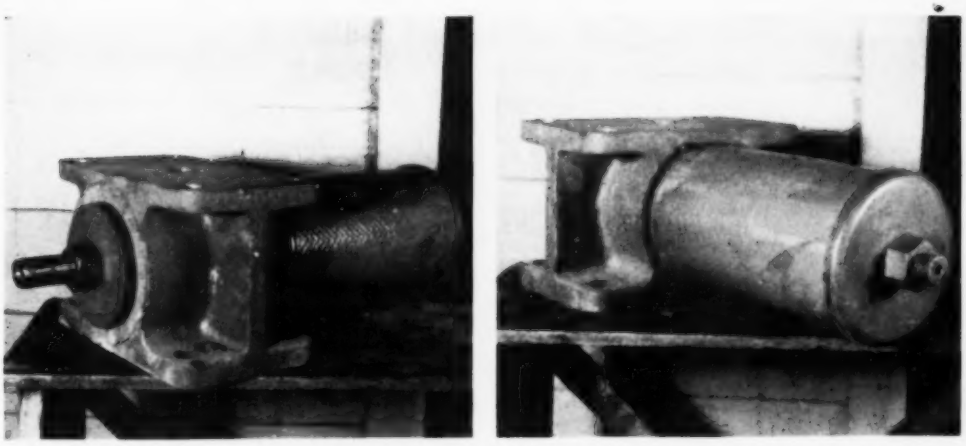
FIRST — late last year the public and the press were given the first glimpse of the COLMOL, Sunnyhill Coal Company's mechanical 'mole' . . . a mobile machine that would dig and load continuously. It received wide-spread publicity.

THEN — coincident with the opening of the recent Coal Show in Cleveland during May came the announcement that Sunnyhill was joining with The Jeffrey Manufacturing Company of Columbus, Ohio, to manufacture and market the unit.

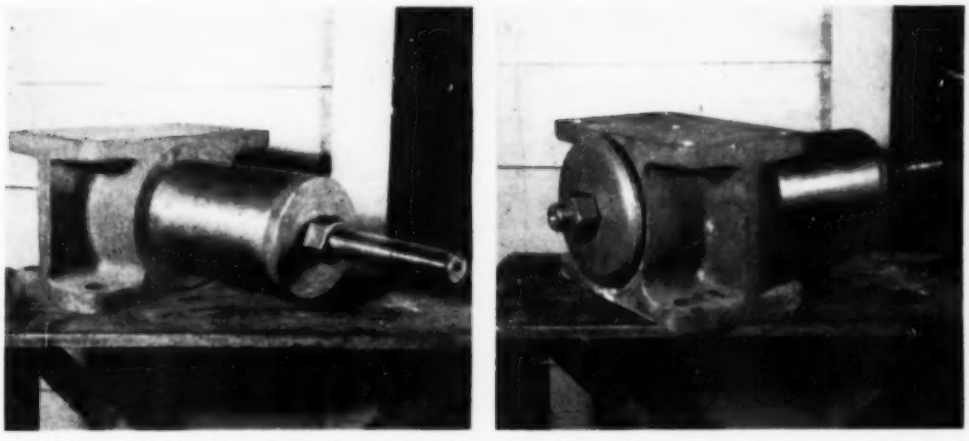
SO — a new company — the COLMOL Company — was formed, bringing together Sunnyhill's proven idea and Jeffrey's accumulated mining machine experience, to develop, produce, sell and service machines embodying the COLMOL principle of continuous mining.

NOW — Under the COLMOL banner and using the vast facilities of The Jeffrey Mfg. Co., production of this new machine is under way in the huge Jeffrey plant in Columbus, Ohio. The Company invites your inquiries and wants you to know that the Jeffrey Sales and Service Organizations are available and anxious to serve you — as always.

THE COLMOL COMPANY
912-24 NORTH FOURTH STREET
COLUMBUS 16 . . . OHIO



OLD BUSHING is forced out of casting by small round plate (left), which is drawn through casting bore by thread bar. Pressure is provided by turning thread-bar nut against larger round plate at opposite end (right), thus drawing bushing into steel cylinder.



NEW BUSHING is inserted into casting by placing smaller plate against outer rim of bushing and turning nut on thread bar (left). Bushing thus is forced into casting and flush against larger plate at opposite end of casting bore.

Device Speeds Bushing Changes

A BUSHING CHANGER for removing and replacing spring-saddle bushings on large coal-hauling trailers without removing the casting from the springs has been developed by Ralph Sanders, mechanic, Mine 15, Pittsburg & Midway Coal Mining Co., West Mineral, Kan.

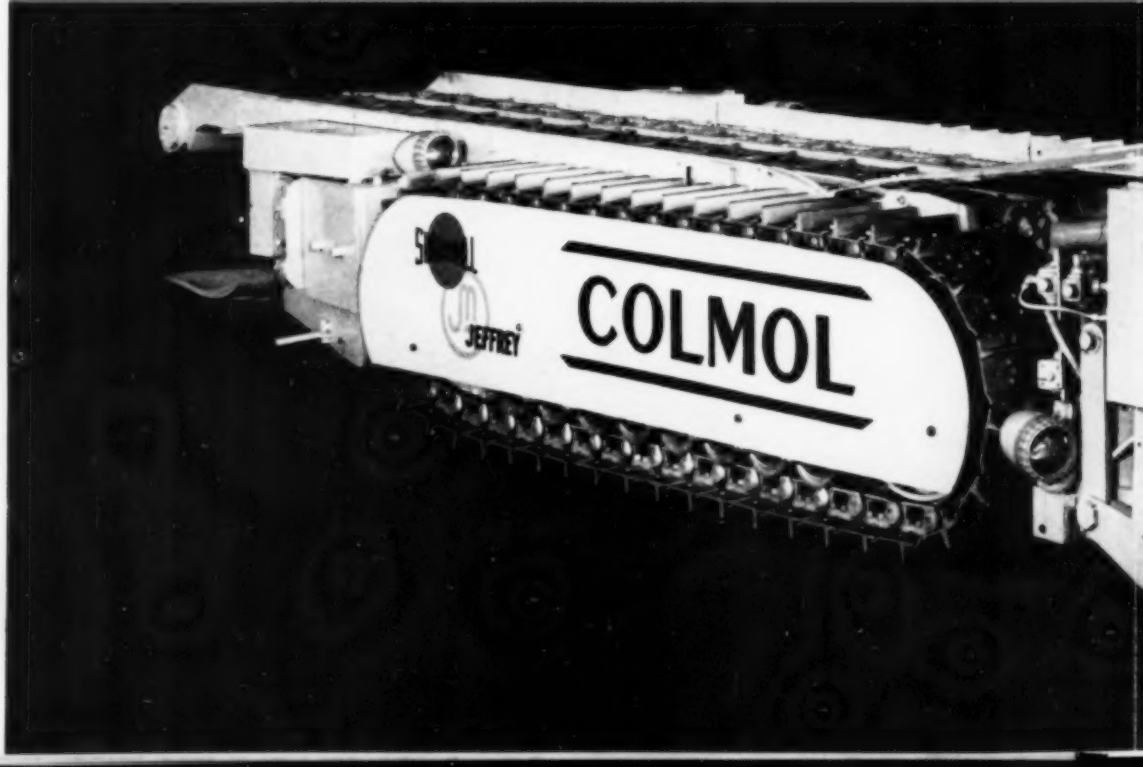
The device, shown in the accompanying photographs, consists of a steel cylinder, two end plates of different size, a thread bar and two nuts. To show clearly how the device works, the photographs were taken on a shop bench. Actually, the bushing changer is designed to permit bushing changes without removing the casting from the springs and saves considerable time.

To remove a bushing, the small end plate, sized to pass through the casting bore and drilled at the center to accommodate the thread bar, is placed flush against the bushing and held in place by a nut. Flush against the opposite end of the bushing, the steel cylinder, with a diameter slightly larger than that of the bushing, is drawn tight against the bushing by means of the larger round plate and the second nut. Pressure from this second nut then pulls the smaller plate through the casting bore, forcing the old bushing into the cyclinder.

After the old bushing has been removed, a new bushing is forced into the casting by reversing the process without, however, using the steel cylinder. The larger plate, which will not pass through the bore, is fixed against one side of the casting and secured with a nut on the thread bar. The new bushing is placed flush against the opposite side of the casting bore and the smaller plate and nut are then turned up tight against the outer rim of the bushing. Pressure to force the new bushing into the casting bore is provided by turning the nut until the inner rim of the bushing is flush against the larger plate on the opposite side.

WHAT THE COLMOL DOES

(Patent applied for)



Cuts and loads (simultaneously) a room approximately 9⅓ feet wide and 4 feet high—face is advanced at the rate of 18 inches to 24 inches per minute.

Advances the face in one operation — moves forward under its own tractive power.

Takes the place of conventional cutting, drilling and loading machines — no shooting required.

Produces upward of 100 tons per man day — proven 3 to 5 tons per minute.

Produces a run-of-mine coal with a minimum of fines — greatly reduced dust hazard.

Leaves floor clean and uniform — less than 1% of coal left in outer corners of the room.

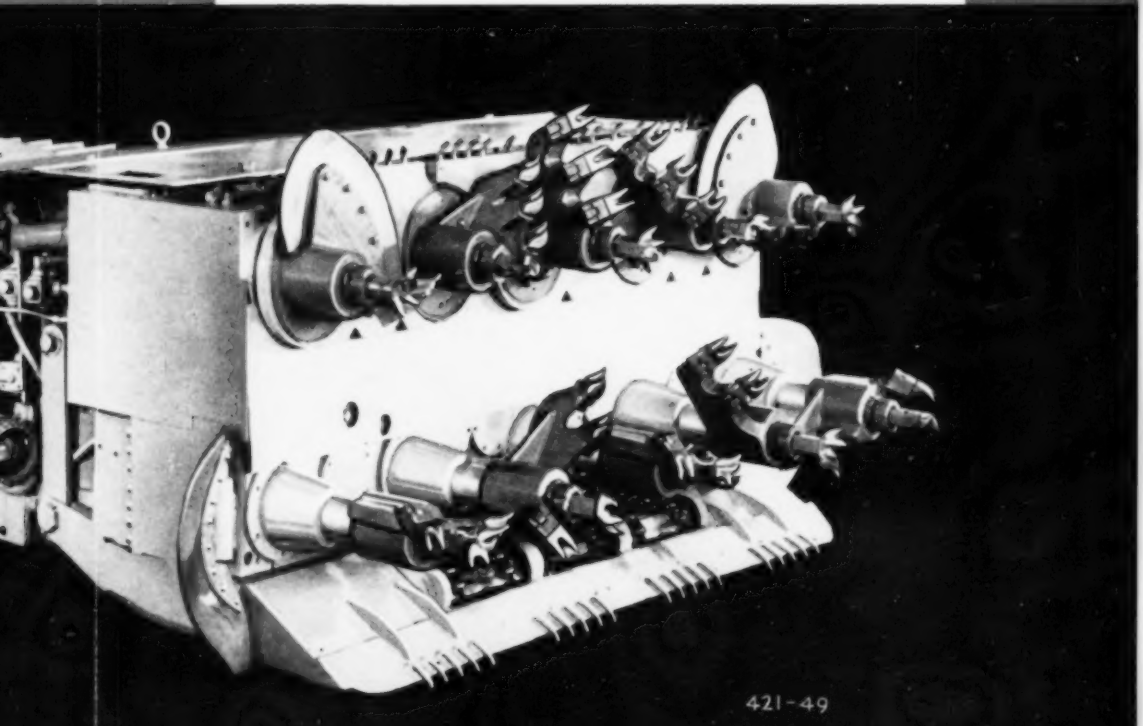
Passes within ¼ inch of a vertical post or timber repeatedly without hitting it — control is accurate.

Stands the gaff — a 20 or 30-ton roof fall will cause no damage — fallen material is removed by the machine.

Operates with little or no vibration — requires less timbering.

Reduces the hazard to operator — he is located near the rear of the unit approximately 20 feet from the face.

Permits mining with reasonable safety under roof conditions unsafe with conventional methods.



421-49

How to Spot and Install Trolley Frogs

THE PROPER POSITIONING of a trolley frog is perhaps one of the most important factors affecting its successful operation, according to *Haulage Ways*, published by The Ohio Brass Co., Mansfield, Ohio. The frog must be made to "take" so that the collector on turnout will follow the turnout leg. Yet the take must not be too great or excessive frog and collector wear will result.

There is usually one location where the frog functions best. In the case of a frog designed with a 10-deg angle, tests have shown this to be the point where the trolley pole makes an angle of 10 deg outside the turnout leg of the frog when the collector is in the exact center of the frog. The trolley pole would then make a 20-deg angle with the straight-through wire, as shown in Fig. 1.

To find the exact spot in the wire where the pole on

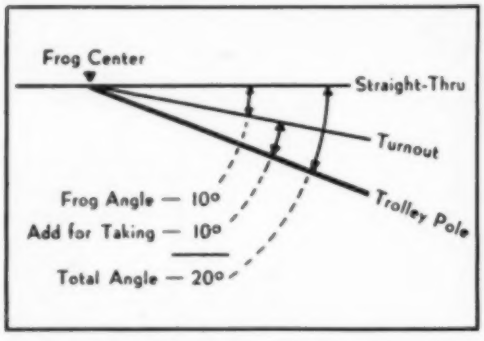
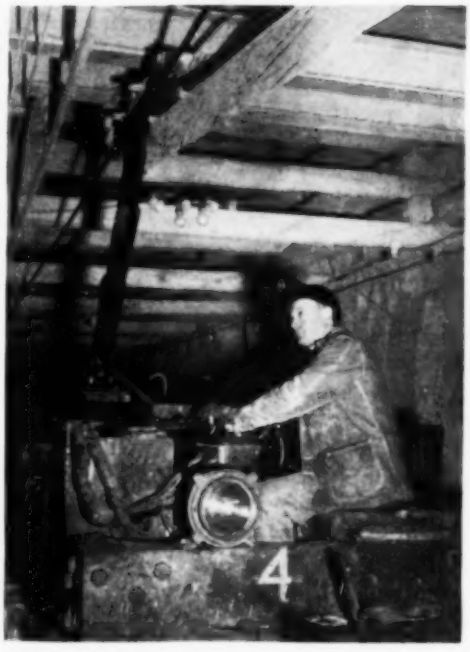


FIG. 1—A 10-DEG FROG works best when the pole at point of turnout makes a 20-deg angle with the straight-through wire.



PROPER POSITIONING of a trolley frog is most important if successful and trouble-free operation is to be secured.

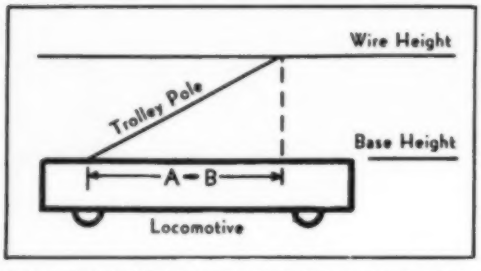


FIG. 2—THE LENGTH A-B equals the horizontal projection of the trolley pole determined at the point of frog installation.

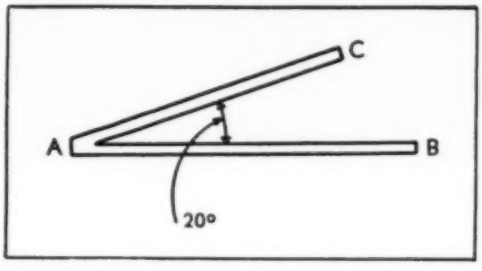


FIG. 3—MAKE a wooden template with an angle of 20 deg and Length A-B equaling the horizontal projection of the trolley pole.

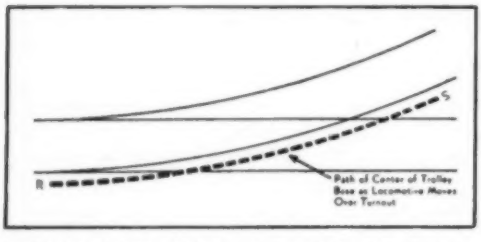


FIG. 4—TRACE THE ARC R-S on the ground along the turnout rail to represent the path of the center of the trolley base as the locomotive moves over the turnout.

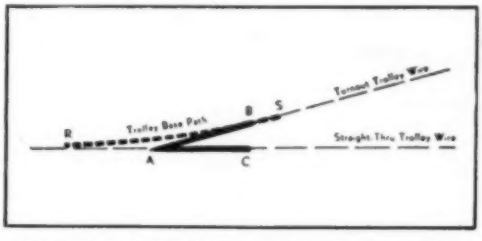


FIG. 5—LAY THE TEMPLATE on the rail with Leg A-C directly under the straight wire. With the template moved until Point B touches Arc R-S, the frog should be installed at Point A.

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Trailing Cables have to be tough to withstand the flexing and twisting they must take while reeling in and out.

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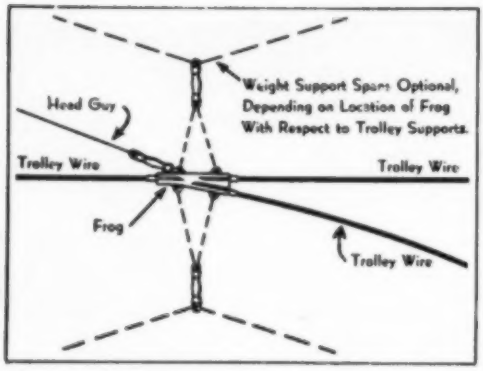

FIG. 6—GUYING A TROLLEY FROG. It is always good practice to guy the frog on outside haulageways, particularly when they are employed in span construction.

turnout will make a 20-deg angle with the straight-through wire, Ohio Brass suggests this simple method:

1. First measure the horizontal projection of the trolley pole (A-B, Fig. 2). Since this length varies with the height of the wire, it is best to make the measurement at the approximate point at which the frog is to be installed.

2. Make a wooden template, as shown in Fig. 3, in which the Board A-B equals the horizontal projection of the trolley pole and the angle between Boards A-B and A-C equals 20 deg. The length of A-C is unimportant.

3. Next trace an arc on the ground along the turnout rail as indicated by RS in Fig. 4. This arc represents the location of the center of the trolley base on the locomotive. It may be traced by making a number of marks in the ballast directly below the base as the locomotive is slowly moved over the turnout.

4. Lay the template on the track with the Leg A-C directly under and in line with the straight-through trolley wire (Fig. 5). Move the template along the track until the Point B intersects the Arc R-S. At this point, A is directly under the spot in the wire where the frog should be installed. It will function properly at this point for all conditions corresponding to the dimensions of the template.

By following this method on several turnouts of same degree, a dimension from frog to switch point or track frog may be secured and used for future installations. With various degrees of turnout, however, the use of the template has the advantage of securing an exact location for the frog and thus eliminating the wear and operational difficulties that accompany an improperly located frog.

With the location established, installing the frog in the wire is a fairly simple matter. For best results, it is recommended that the straight-through wire be strung uncut and under tension before the frog is placed in the wire. First, actually place the frog on top of the wire and mark its length on the wire with a file or hacksaw blade. Next, take tension off the marked portion, using wire eccentrics and a block and tackle. Cut the marked length out of the wire and install a tongue tip on each cut end. Then bolt the tips to the frog body, release the tension and the frog is in position in the straight-through wire. Turnout wires are handled in the same manner, except that they may be attached to the frog before the wire is tensioned if desired.

It is always good practice to guy a trolley frog on outside haulageways, especially when used in span construction. One method of guying is illustrated in Fig. 6.

Tune-up Tips for Tractors

A LITTLE TIME spent tuning-up tractors and allied construction units will pay off handsomely, reports the Allis-Chalmers tractor division service department, in offering the following suggestions:

Debris in the radiator core is a primary cause of high operating temperature. First straighten the fins and flush the cooling system. Check for leaks and flabby hose. If the thermostat isn't working, it should be replaced, since low operating temperature is just as bad for a tractor as overheating.

Minor breakdowns can be as irksome as a sore thumb. Go over the fan blades and straighten them if they are bent. Check the fan bearings, put on new belts if necessary, or at least adjust them. Then examine the engine mountings—they should be sound and securely fastened.

Next, check the air cleaner and pipes for leaks. A tractor will run much better and longer on clean air. When fuel and oil pumps quit, the tractor is a dead duck! So inspect the gages. Low oil pressure may merely indicate a faulty gage or, on the other hand, the need of a complete engine overhaul.

When you reach the engine, get the outside just as clean as the inside. An oily dirt covering becomes very effective insulation and makes engine cooling a difficult task. Tighten-up oil and fuel lines, inspect seals, conduct a power check and observe oil consumption, which also may indicate that an overhaul job is necessary. On a two-cycle diesel engine, it will pay to clean the air box and port holes in the cylinder liners. Through the port holes you can look for broken rings and scored pistons.

Stiff joints in steering clutches, engine clutch, and brake linkage should not be tolerated. Take apart the linkage and get new pins if the old ones are worn. At least clean off the rust and oil the joints. Possibly, the engine clutch, steering clutches and brakes need adjustment. While you have the linkages apart, adjust them and make a note to keep them adjusted.

Winter, of course, is really difficult on the battery. Many batteries either give up entirely or are too weak to do much good after fighting sub-zero blasts. If you expect your equipment to pay off on the job, clean up the batteries, recharge them if possible, and then tidy up the terminals, clamps and wiring harness and check the light switch, starter, generator and ammeter.

The tracks need checking also. Perhaps the grousers are worn and can't hold or the shoes aren't bolted tightly to the rails. Pins and bushings with excessive wear should be turned or replaced and, perhaps, a complete new set of tracks should be ordered. The truck wheels and support rollers should be inspected for free play and repaired if necessary. Then check the adjustment of the tracks and operation of the track-release mechanism.

It Takes All Kinds!

***DON'T HESITATE** to send us any or all the operating, mechanical, electrical or safety ideas that have successfully worked for you. Other mining men will profit from and thank you for publication of your ideas in this section. And COAL AGE, incidentally, will pay you $5 or more for each, on publication.*

No Twist— No Stress— No Strain

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• That's because only Mack six-wheelers have the advantage of Mack's famed Balanced Bogie. Here's an outstanding development that means unmatched flexibility . . . mastery of the toughest terrain without stress or strain.

The exceptional flexibility of the Mack Balanced Bogie insures equal traction, even tire loading and uniform braking on all four wheels. Exclusive Mack Power Divider assures traction at all times, regardless of terrain.

Simplicity and rugged strength are typified in the functional construction of the Balanced Bogie. Maintenance requirements are reduced to a minimum. Outside of the brake system only four points on the assembly require lubrication. No place in the suspension ever needs adjustment.

For detailed information on how this and other Mack features can cut costs and increase profits on your particular job, see your nearest Mack branch or dealer.

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Mack Trucks, Inc., Empire State Bldg., New York 1, N.Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

CUTS COSTS FROM FACE TO TIPPLE

To Control Soaring Costs, Coal Mine Adopts One Sun Lubricant After Another—Now It's 100% Sun-Lubricated

Trying one Sun product often leads to adoption of Sun products for every use. Take the case of a bituminous-coal operator whose profits were being whittled down by high lubrication costs. Four years ago, on the advice of one of our engineers, he tried out a Sun "Job Proved" mine car grease.

He found it the most satisfactory grease he had ever used—it lubricated better, went farther, cost less. Next he adopted Sun oils and greases for the locomotives. Later he discarded a third competitive lubricant in favor of a Sun "Job Proved" product.

Finally he was convinced Sun oils and greases meant improved efficiency for every kind of mining equipment. Today the mine is 100 percent Sun-lubricated. With Sun mine lubricants on the job the mine is enjoying the best lubrication, at the lowest cost, since the day it opened.

Here is a typical example of the advantages of Sun "Job Proved" mine lubricants. Whatever the machine, there is a Sun mine lubricant to keep it operating at maximum efficiency. For complete information, call your nearest Sun Office.

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News Round-Up

Northern Wage Talks Start; Coordinator Plan Proposed

COAL MINERS throughout the country returned to work June 20, following a week's stoppage unexpectedly called by John L. Lewis to effect what he termed "a brief stabilizing period of inaction," as the UMWA prepared to carry on simultaneously separate wage-contract negotiations with four different operator groups.

Of unusual interest to the industry was the announcement June 13 that a number of coal operators in the northern fields, representing a production of close to 200,000,000 tons yearly, had agreed to set up an industry coordinator to conduct contract negotiations and to assist in bettering the industry's labor relations on a continuing basis throughout the year. The position had been offered, it was reported, to Harry M. Moses, who, if he accepted it after due consideration, would resign as president of the H. C. Frick Coke Co.

Since May 25, contract negotiations between the Southern Coal Producers' Association and union representatives had dragged on at Bluefield, W. Va., with indications reported that the union apparently was not making a serious attempt to bargain collectively. Immediately on opening the conference, Mr. Lewis raised the question of the tonnages represented by the Association and on the second day forced a week's adjournment of the conference to permit the credentials committee to study the tonnages represented. The adjournment was bitterly contested as a "walk-out" by the operators, who contended that their representation was well defined and only slightly affected by the withdrawal of two state associations and several individual companies. Other delaying tactics and the failure of the miner representatives to put forth contract demands throughout the month of meetings brought forth charges of "stalling" from various operator representatives.

In contrast, the negotiating conference with northern and western operators was opened June 22 at White Sulphur Springs, W. Va., without incriminations and in an aura of apparent good will. It was quickly agreed to begin executive sessions the next day, with the bargaining group pared down to eight or nine from each side. Operator spokesmen announced that they considered the present contract effective until Aug. 14, since the Taft-Hartley Act requires 60 days' notice of the termination of a contract and they were not so notified by the union until June 14. While he did not confirm their contention, Mr. Lewis would make no statement to dispel their belief. Inasmuch as the southern operators initiated the wage conference and gave notice of the termination of the contract on June 30, it was considered possible that, unless a contract is negotiated in the meantime, their mines may remain closed following the vacation period.

On the second day of the northern conference, Mr. Lewis reportedly told operators that he wanted to discuss increased wages, a shorter work day and improvements in the welfare and retirement fund. Operators were said to have replied that they would like to discuss with him the economic problems of the industry, but no specific proposals by either side were immediately reported.

In their conference, southern operators June 6 asked the union to consider four specific proposals, as follows: (1) addition of a half-hour to the work day, (2) elimination of the "able and willing" clause, (3) a curb on "memorial" stoppages and (4) placing the welfare and retirement fund on a sound actuarial basis. Although union representatives were reported to have discussed the proposals thoroughly no action on them was obtained and to date the union had made no specific demands, according to reports. A request by operators for extension of their present contract until Aug. 15 was refused by miner representatives.

Union negotiations with the U. S. Steel Co. and subsidiaries resumed June 23 at White Sulphur Springs, following a one-day meeting in Philadelphia, June 13, arranged at Mr. Lewis' request. The company was represented by a delegation headed by Harry M. Moses, president, H. C. Frick Coke Co. While no official announcement was made after the meeting, it was reported that the steel company representatives maintained that the responsibility for setting up contract standards rested primarily with the commercial operators and that also since they were there at Mr. Lewis' invitation, it was up to him to present his bargaining demands. It was understood that Mr. Lewis made no specific proposals and the conference was adjourned until June 23.

On June 14, at the same time he notified the northern and western operators, Mr. Lewis notified anthracite producers of the termination of their contract and suggested that negotiating conferences be scheduled to begin by June 24. In his letter, Mr. Lewis said that a successor contract should be effective not later than Aug. 15 and as a result it was expected that there would be no interruption of anthracite production until that date. No definite date for the conference was immediately set although operator representatives suggested that it start on July 7.

Announcement of the coal-coordinator plan brought reports of considerable dissension on the subject throughout the industry as a whole, with the southern group reported to be bitterly opposed. The Senate banking and currency committee voted June 15 to investigate the plan to determine whether it violated the antitrust laws and how it would affect the interests of the consumers and of the small independent operators, many of whom were said to be against the plan.

Newspaper accounts of the coordinator plan reporting that northern

Featured in This Section

Editorial—J. H. McGraw Jr.	p. 116
Obituaries	p. 118
Association Activities	p. 118
New Developments	p. 118
Personal Notes	p. 122
Foreign Developments	p. 122
BCR Annual Meeting	p. 124
NCA Regional Meeting	p. 130
West Virginia Institute	p. 134
Central Appalachian A.I.M.E.	p. 140
Mine Inspectors' Institute	p. 144
Coal and Business Activity	p. 162
Preparation Facilities	p. 168
Coal Publications	p. 170

operators had agreed with Mr. Lewis on a "czar" for the industry, whose function would be not only to bargain with the UMWA, but also to bring about a "permanent stabilization" of it were emphatically denied by George H. Love, president, Pittsburgh Consolidation Coal Co., one of the originators of the plan.

In his statement, Mr. Love said: "This is an unfortunate reference to what should be a constructive move, the purpose of which is not to establish a 'czar' or 'limit production' or create 'an industrial monopoly to match the labor monopoly.' The purpose is simple—it is to bring order and dignity into labor relations of the industry and to avoid the chaos which has too often attended labor negotiations and inconvenienced the public...

"There have been no secret negotiations, nor secret plans with Mr. Lewis or anybody else, but a number of coal operators in Pennsylvania, Northern West Virginia, Ohio, Indiana and Illinois, have been considering a plan to form a permanent organization not only to conduct wage negotiations with the UMWA when contracts expire, but to carry through continually assisting in the interpretation and performance of those contracts, particularly with reference to promoting greater safety in coal mines. Mr. Moses has been approached to see if his services might be made available to all of those in the industry who desire to participate in the plan. He now has the matter under consideration but as this would, of course, involve his resignation as president of the H. C. Frick Coke Co., and severing all connections with U. S. Steel, the orderly completion of the details of such an organization will necessarily take some time.

"If Mr. Moses will take the leadership in this industry's troublesome labor negotiations in the future and if such an organization can be perfected, we will have taken a long step forward toward the necessary goal of more peaceful labor relations in the best interests of the public, the employees of the coal industry, and the owners."

Earlier, on May 27, the National union shop clause in the UMWA wage contract with the captive mines violated the Taft-Hartley Act and ordered the UMWA to dissolve the union shop clause and to stop encouraging the miners to strike over the issue. The UMWA June 6 filed an appeal of the ruling with the U. S. Circuit Court of Appeals and thereby prevented the NLRB from securing an injunction for its enforcement.

The U. S. Circuit Court of Appeals June 6 upheld the contempt of court conviction of the UMWA and John L. Lewis for failing to carry out Judge Goldsborough's order to end the 1948 coal strike over miners' pensions. Unless reversed by the Supreme Court, the decision means that Mr. Lewis and the union must pay the fines of $20,000 and $1,400,000, respectively, imposed by Judge Goldsborough.

●

British Coal Industry Reports 1948 Profit

Great Britain's nationalized coal industry in 1948 showed a profit of about £1,700,000 ($6,800,000), as compared with a loss of about £23,250,000 in 1947, according to a report released by the National Coal Board June 22. The profit was made possible, however, only by steadily increasing prices to consumers.

Production costs in the coal mining industry have continued to rise, the report indicated, and threaten the country's position in the export field when the seller's market, already on the wane, disappears completely. By the end of 1948, production costs had risen to $9 a ton, as compared to $3 a ton in 1938, the report said.

●

Old Timers' Award for West Virginia Graduate

An award by the Old Timers Club to an outstanding senior in the School of Mines, West Virginia University was recently presented by Dr. C. E. Lawall to William N. Poundstone, Morgantown, W. Va., a 1949 graduate in coal mining engineering. Dr. Lawall made the presentation at a meeting of the general engineering Society of the College of Engineering and the School of Mines, at which time he spoke on "The Young Engineer in Industry."

Mr. Poundstone, the son of Mr. and Mrs. J. S. Poundstone of Morgantown, maintained an excellent academic record and was active in campus activities. He is a veteran with 2½ years' army service.

●

State Legislatures Act On Mining Regulations

Legislation giving the Illinois director of mines and minerals full responsibility for enforcing mining laws (see p. 138) was unanimously passed by the Illinois House June 20. The measures were to be acted on by the Senate shortly.

In Pennsylvania, Gov. Duff in late May signed into law a measure permitting any political subdivision to acquire by gift, agreement, lease or purchase underground coal to prevent subsidence, collapse or caving-in of the surface. The bill was put through the assembly in the place of a plan under consideration for a time that would have provided for a tax on each ton of coal produced to raise funds that would have been used for fighting mine fires and the prevention of cave-ins. Under the new law, local authorities are authorized to condemn coal if no agreement with the owners can be reached, providing that the price fixed also includes consequential damages defined as development cost and loss of profits.

Gov. Duff also signed a bill increasing from $200 to $300 an acre the bond required of anthracite strip-mine operators to assure restoration of the land. The minimum bond also was increased from $2,000 to $3,000. A bill requiring posting of the anthracite safety law in pamphlet form at the mines also was signed.

Allocation of $12,000,000 more for the clean-up of the Schuylkill River also has been approved by Gov. Duff. The funds, which are to be used for correcting existing and preventing future silting of the river, are in addition to some $5,000,000 previously ear-marked by the 1949 General Assembly for the project. The newly created General State Authority has taken over from the Pennsylvania Department of Forests and Waters all the permanent construction on the Schuylkill project, totaling another $8,430,000.

THIS MONTH'S COVER—The distillation area (upper center) of the new coal-hydrogenation plant at Louisiana, Mo. For the complete up-to-the-minute story on synthetic-liquid-fuels development, see "Making Oil From Coal" beginning on page 70.

COMING IN AUGUST COAL AGE

● WHAT THE WELFARE FUND IS DOING—An 8-page report on the Fund's expenditures and results to date, and plans for the future.

● GROUNDING AT DEEP AND STRIP MINES—Latest data on procedures, experience and results.

● CONTOUR STRIPPING AT FOLK MINING CO.—Dragline stripping and two-stage coal loading.

● ONE-MAN BOTTOM DRILL—First pictures and story of a new rig designed by Consolidation (Ky.).

● HOW TO OPERATE A STOPER—Step-by-step account of an operation becoming more important every day with the rapid increase in "roof bolting."

● AND, IN ADDITION, plenty of time- and money-saving ideas in the regular monthly sections: Foreman's Forum, Operating Ideas, News Round-Up and Equipment News.

"Give us the tools..."

YOUR ONLY CHANCE of Getting Ahead

Where is the "brave new world" so glowingly promised us by the politicians during and after the war? We were told then that postwar America would live 50% better than it had before. Why has that promise faded out? Why are men today discouraged and frustrated?

We have not yet made good 1944's promises because the *American worker turns out no more in an hour now than he did in 1941.* We are getting more total production in our country – but only because we have more people working. Not because each one of us is producing more. American industry's ability to turn out more and more goods – with less of each worker's time and effort – has been stymied for eight long years.

Progress has been blocked because in some cases workers have not been willing to work as hard as they did before the war. In other cases unions restrict the use of labor-saving machines and methods. In some places obsolete building codes and ordinances prevent advances. In still other cases progress has been blocked by collusive practices between unions and manufacturers or operators.

But the biggest block to progress is the fact that our industry in the United States has been unable to provide our workers with all the new tools and equipment that they need.

Increasing productivity – that is, each one of us turning out more in each hour of work – is the key to higher living standards. Productivity depends directly upon the kind of tools workers use. His tools, more than anything else, determine how much a worker can turn out; and what his paycheck will buy depends in large part on what he turns out – not on how long or how hard he works.

Look what happened in our country in the forty years from 1900 to 1940. Productivity of the United States *more than doubled.* It doubled because:

Business investment in capital equipment gave workers new tools – tools that had three and one-half times as much power –

So – Americans' living standard rose almost 50% while the average work week was dropping from 61 to 43 hours.

Industry did continue to raise its output per man hour, even in the depressed 1930's. But it did it because, with unemployment widespread, companies used only their most efficient equipment. *Actually the great depression saw industry fall far behind in the job of providing workers with new tools.*

Then came World War II. Few new tools for peacetime industry were produced. *As a result of depression and war, the U.S. fell behind in needed investment in new industrial facilities by more than $100 billion.*

Since the war business has spent almost $60 billion for new plants and equipment –

But the greater part of that money went to *expand* production to take care of the needs of our bigger population, and to *replace* plants and equipment that were worn out and ready to be junked at the end of the war.

continued on next page

Only a small fraction of the $60 billion went to *modernize equipment* – the equipment that increases efficiency and improves productivity of the individual worker.

Right now industry is desperately trying to do the job of increasing efficiency of machines so that each worker can turn out more.

McGraw-Hill's national survey of Business' Needs for New Plants and Equipment shows that manufacturers plan right now to spend in the 5 years ahead three-quarters of their capital funds to replace and modernize facilities. The biggest part of the more than $55 billion industry plans to spend on its plants and equipment will go directly to improve efficiency of the individual.

If industry can carry through its plans – and expand them as it would like to and as it must do – the U. S. can catch up on its depression-war-time lag in progress within a few short years.

If American industry is allowed to earn the money to buy the equipment, it can raise the American standard of living 50% in our generation – in the next 25 years. No other nation can promise its people that much – and deliver on the promise.

But the promise can only be fulfilled by American industry. Wherever you turn, industry has dramatic new ways of doing things. Using oxygen by the ton, steel makers are increasing production from blast furnaces by 20%. New high-speed machine tools are doing three times the work of 1940 tools. A new coal-mining machine will multiply a miner's daily output 10 times. Diesel locomotives do the work of three steam locomotives on many jobs.

New products – and larger production of standard products – are already making their impact on American life. Two million Americans will get new television sets this year. Automatic washing machines, electric dishwashers, and home freezers are easing the daily tasks of thousands of housewives. Millions of homes that did not have them before the war now have telephones, automatic heat and refrigerators. Frozen foods, nylon clothing – these and many other things coming along now – will shape the *real* new world for Americans.

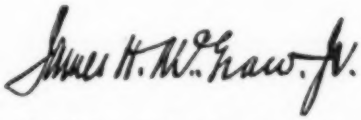
But industry can provide them only if it can keep on investing at least $15 billion a year now – and more in future years – in new plants and equipment.

Today Washington is taking a course which, if pursued, will make that investment by industry impossible. Government spending now strains our resources to the limit, and more multi-billion dollar spending proposals are being piled on. *But government spending cannot improve American living standards.* It never has, and it never will. Increasing government spending *now* will only block progress, because the government proposes to pay for its plans by taxing away the profits industry is using, and must continue to use, to improve and expand its plants and equipment – our only hope for greater worker productivity and higher living standards.

Better living can only be paid for with more production. And we can only get more production by increasing productivity – by each one of us producing more for each hour of work.

The first thing is to get the production – in peace and in war – for better living – for security. Industry is planning to provide it – and is using $13 billion of its profits this year to improve and expand its facilities.

The only sensible, the only safe national policy is to make it possible for American industry to do its job – not to terrorize private industry with proposals of ruinous taxation and paralyzing controls and threats of nationalization. For American industry is not a thing apart from the American people any more than is government. American industry is the lifeblood of the American people and whatever makes industry do its work better contributes more to the common welfare than a bureaucratic government can ever hope to do.



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Obituaries

George F. Campbell

George F. Campbell, 60 president of the Illinois Coal Operators' Association and of the Old Ben Coal Corp., died June 18 in the Evanston (Ill.) Hospital, following a long illness. Mr. Campbell was widely known throughout the country for his interest in industry affairs and had for many years been active in the national contract negotiations as the representative of the Illinois producers. A graduate of Purdue University, Mr. Campbell first joined Old Ben in 1913 as an engineer and was with the company until his death. He served as vice president and general manager from 1927 to May, 1947, when he was named president.

Judge Frank E. Wood, 67, Cincinnati attorney and president of the Carrs Fork Coal Co., Portsmouth, Ohio, since 1932, died May 25 in the Holmes Hospital, Cincinnati, following a heart attack two days earlier.

Edward J. Newbaker, 75, vice president and general manager, Berwind-White Coal Mining Co., Windber, Pa., died June 10 at his home in Windber, following an extended illness. A graduate of the United States Military Academy, Mr. Newbaker was associated with the Lehigh & Wilkes-Barre Coal Co., predecessor of the Glen Alden Coal Co., before joining Berwind-White in 1918. He was a director of the Central Pennsylvania Coal Producers' Association.

Walter A. Bishop, 73, chief engineer, Pocahontas Fuel Co., Pocahontas, Va., for more than 25 years, died June 10 in a Bluefield, W. Va., hospital. Mr. Bishop, who first came to the Pocahontas field in 1901, had long been identified with coal development in the area and also was president of the West Virginia Armature Co., Bluefield, and a member of the board of directors of the Bank of Pocahontas. The town of Bishop, Va., site of one of the company's mines, was named in his honor.

John E. Jeffreys, 73, an Iowa state mine inspector and president, Mine Inspectors' Institute of America, died May 17 in Mercy Hospital, Des Moines, of a heart ailment. Mr. Jeffreys had been a state mine inspector since his appointment in 1931, and was the first president of the Mine Inspectors' Institute to die in office.

●

Association Activities

American Mining Congress has announced that E. R. Price, manager of coal properties, Inland Steel Co., Wheelwright, Ky., has accepted the chairmanship of the program committee for its 1950 Coal Convention to be held in Cincinnati, Ohio, April 24-26. Under Mr. Price's direction, a committee of coal-mining leaders, including both operators and manufacturers of equipment, will draw up a program of economic and operating subjects for presentation and discussion. While the 1950 meeting will not include an equipment exposition, the AMC is expected to revive and expand the "Miners' Exhibit"—a prewar feature that offers operating men an opportunity to display new devices or operating "kinks" they have developed for increasing efficiency or cutting costs.

Georges Creek & Upper Pocahontas Coal Association recently re-elected its officers, as follows: president, Andrew B. Crichton, president, Johnstown Coal & Coke Co., Johnstown, Pa.; vice president, Dr. George D. Campbell, president, Campbell Coal Co., Piedmont, W. Va.; and secretary-treasurer, H. R. Freeman, Cumberland, Md.

Society of Economic Geologists has named Dr. Morris M. Leighton, chief, Illinois State Geological Survey, Urbana, president-elect for 1950-51. Dr. Leighton last fall completed his 25th year as chief of the Illinois Survey.

Big Sandy-Elkhorn Coal Operators' Association, Pikeville, Ky., at a meeting June 10 in Lexington, Ky., re-elected all of its officers as follows: president, B. F. Reed, Drift, Ky.; vice president, W. W. Goldsmith, Charleston, W. Va.; executive secretary, H. S. Homan, Pikeville; and treasurer, J. H. Hunt, Prestonsburg, Ky. Named as directors of the association were: Harry LaViers, chairman, S. M. Cassidy, O. O. Tarleton, R. D. Davis, V. D. Picklesimer, A. P. Boxley, A. M. Ayers, J. E. Bowman, H. K. English, R. A. Hedland, Edgar Dale, D. L. Francis, W. F. Pioch, Joseph Harris and A. H. Mandt.

Coal Producers' Association of Washington, at its annual meeting June 7 in Seattle, elected the following officers: president, Earl R. McMillan, assistant manager of coal operations, Northwestern Improvement Co.; vice presidents, William Strain, owner, Strain Coal Co., and Harry Merbach, vice president in charge of sales, Bellingham Coal Mines; and secretary-treasurer, James E. Ash. Elected to the board of trustees, in addition to Messrs. McMillan, Strain and Merbach, were: Thomas Murphy, manager, coal operations, Northwestern Improvement Co.; Harry S. Patrick, president, Roslyn-Cascade Coal Co.; Fred Bianco, owner, Bianco Coal Mines; James Bolde, owner, Carbon Fuel Co.; John H. Morris, president, Palmer Coking Coal Co.; and George W. Sheatsley, president, Monarch Coal Mining Co.

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New Developments

●Purchase of the mining properties of the pioneer Coal Co., Kettle Island, Ky., by O. H. Viall, Barbourville, Ky., was recently announced by Albert B. Hill, president of Pioneer, and the Black Star Coal Corp. The operation, which was recently closed, will be reopened by the new owner and associates as the Adventure Coal Co. Access to some 8,000 acres of coal and lumber land held by Mr. Viall will be secured through the Pioneer property. The sale reportedly included about 175 houses, coal tipple, company store and some 700 acres of coal land.

●Work on the new extension of the Paw Paw branch of the Monongahela Ry. west from Grant Town, W. Va., (*Coal Age*, April, p. 130), was scheduled to begin about July 1, according to an announcement by J. A. Appleton, president of the road. The new line, which was recently approved by the ICC, is expected on its completion by the fall of 1950 to open up some 10,000 acres of Pittsburgh coal, estimated to contain 85,000,000 tons. The Jamison Coal & Coke Co. is reported to be planning development of large coal holdings in the area and the erection of a new preparation plant on the Monogahela's extension.

●West Virginia Coal & Coke Corp., Omar, W. Va., opened earlier this year its new No. 19-C Stirrat drift mine at Stirrat, W. Va. The Alma seam is being mined and the operation is being planned for a life of 25 years and a capacity of 3,000 tons daily. Shipments are made via the C. & O.

●Daily capacity of the new drift mine to be opened in 1950 or 1951 by the Kaiser Co., Inc., Sunnyside, Utah, is expected to be 2,500 tons, with a life expectancy of 50 years. The operation will be located in Emery County and will mine the Sunnyside seam.

●Wabash Ridge Corp., Lighting Bldg., Punxsutawney, Pa., recently opened its new Midmont strip mine at Rasse-

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A. B. Blanton (left), mine foreman; Carlisle Howard, vice president; Geo. Burke, preparation engineer; and A. J. Moon, secretary, Middle Fork Coal Co., Paintsville, Ky.

A. E. Spotti (left), asst. supt., Arkwright No. 1 mine; M. H. Ireland, asst. supt., Booth No. 6, and R. A. Maurer, production engineer, Christopher Coal Co., Monongalia County, W. Va.

COAL MEN ON THE JOB

F. R. Zachar (left), general superintendent, Christopher Coal Co., and J. C. Constable, superintendent, Booth No. 6 mine, Monongalia County, W. Va.; N. A. Sullivan, superintendent, Empire preparation plant, and A. L. McDonald, shop foreman, DeBardeleben Coal Corp., Sipsey, Ala.

Milt Proffit (left), tipple foreman, King Mountain Mine No. 1, Virginia-Jellico Coal Co., Clearfield, Tenn.; H. W. Gilliland, assistant superintendent, Leavell Coal Co., Porum, Okla.; Cornelius McCann, tipple foreman, Old Mac Coal Co., Red Oak, Okla.; and John Wayland, pit foreman, Old Mac Coal Co., Red Oak, Okla.

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las, mining the Lower Kittanning seam. Daily capacity is 1,000 tons and shipments are made via the B. & O. and Erie railroads. Tipple equipment include screens, picking table and crusher.

●Fentress Coal & Coke Co., Nashville, Tenn., reportedly was planning to open this month its new Fentress No. 7 slope mine at Monterey. Planned capacity is 2,000 tons daily, from the Bon Air No. 2 seam.

●The Indian Creek Mine of the Indian Creek Coal Co., Knoxville, Tenn., is reported to have been sold to the Trimore Coal Corp., Hamilton Bank Bldg., Knoxville, Tenn.

●Green Ridge Fuel Co., Ottumwa, Iowa, was to open July 1 its new Green Ridge strip mine near Ottumwa. Shipments will be made by truck and the operation is planned for life expectancy of 15 years and a daily capacity of 300 tons.

●The Pursglove Mining Co. and the Christopher Coal Co., subsidiaries of the Pittsburgh Consolidation Coal Co., were scheduled to be merged last month into one organization, under the name of the Christopher Coal Co.

●The Wylam mine of the Tennessee Coal, Iron & R.R. Co., Fairfield, Jefferson County, Ala., has been closed because of exhaustion of recoverable coal. The Wylam washing plant will continue to operate and will receive coal from the company's recently opened Concord mine until the washing plant now under construction at that mine is completed. More than 25,000,000 tons of coal has been mined from the Wylam operation since it opened in 1891, according to the company.

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Personal Notes

James D. Francis, president, Island Creek Coal Co., and subsidiary companies, Huntington, W. Va., was named chairman of the boards of the companies at a directors' meeting held in Boston, June 14. **Raymond E. Salvati**, formerly vice president in charge of operations, was elected president, to succeed Mr. Francis. **A. L. Lynn**, previously assistant to Mr. Francis, was named a vice president of Island Creek and Pond Creek Pocahontas coal companies. **H. A. Glover** was named to succeed Mr. Francis as president of the Island Creek Coal Sales Co. **Robert D. Ellis**, superintendent of Island Creek's Mine No. 16, has been transferred to superintendent of the company's Mine No. 24 at Ragland, W. Va. Mr. Ellis succeeds **Bill Pritchard**, who has been appointed assistant superintendent, Mines Nos. 24 and 25.

Frank Doxey, of London, Eng., has been appointed assistant to the general manager of coal operations, Dominion Coal Co., Ltd., Sydney, N. S., according to an announcement by H. C. M. Gordon, general manager. Mr. Doxey was formerly production manager, Area No. 2, Northeastern Division, for the British National Coal Board.

J. B. WARRINER, chairman of the Board, Lehigh Navigation Coal Co., Lansford, Pa., has announced that by the end of the year he will transfer all his remaining executive authority to Evan Evans, president of the company. Citing his age and the fact that a fully qualified successor is available in Mr. Evans as factors in his desire for the change, Mr. Warriner said that after Dec. 31 he proposes to confine his activities to research and study to develop new by-products and new uses for present products, and to plans for increasing the company's efficiency.

J. H. Pascoe, general superintendent, Bellingham Coal Mines, Bellingham, Wash., has been elected chairman of the Washington State Mining Board. Mr. Pascoe was recently appointed to the board as the management representative.

Paul C. Major, formerly associated with Price, Waterhouse & Co., has been elected vice president and assistant treasurer, Penowa Coal Co., Pittsburgh, Pa. **Leonard P. Sasso** has been re-elected president and chairman of the board of directors of the company. Other officers of the company are: **John E. Anderson**, assistant to the president; **R. C. McKelvey**, secretary and controller; **W. M. Thomas**, assistant secretary and assistant treasurer; and **C. E. Swartzwelder**, assistant treasurer.

R. C. Collier, mine foreman, Mine No. 207, Consolidation Coal Co. (Ky.), Dunham, Ky., has been transferred to mine foreman of the company's new Hendrix mine at Deane, Ky. **R. D. Kyle**, formerly assistant mine foreman, has been promoted to succeed Mr. Collier as mine foreman at Mine No. 207.

R. D. Jones has been appointed superintendent for the New River & Pocahontas Consolidated Coal Co., at Dunlap, Ky.

Frank Davis has been promoted to assistant superintendent, Junior mine, and **Emmett Ferrell** to assistant superintendent, Mitchell Branch mine, Red Jacket Coal Corp., Red Jacket, W. Va. The promotions followed the retirement of E. F. Smith, superintendent of the Mitchell Branch mine, and the consolidation of the two mines under A. F. Cook as superintendent (*Coal Age*, June, p. 150). Mr. Davis is succeeded as general mine foreman at Junior by **Julius Howell**, formerly supply supervisor. **Tony Webb**, formerly assistant mine foreman, has succeeded Mr. Ferrell as general mine foreman at Mitchell Branch mine.

James D. Francis, chairman, Island Creek Coal Co. and subsidiary companies, Huntington, W. Va., received the honorary degree of Doctor of Laws from West Virginia University at the 1949 Commencement exercises held in Morgantown May 30. The citation, by A. C. Spurr, Fairmont, president of the university's board of governors, made the recommendation for the degree in recognition of Mr. Francis' achievements in the fields of education and industry. In addition to his activity in the coal-mining industry, Mr. Francis is a trustee of Mary Baldwin College, Staunton, Va., and of Pikeville College, Pikeville, Ky.

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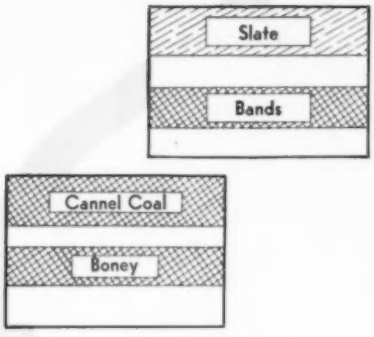
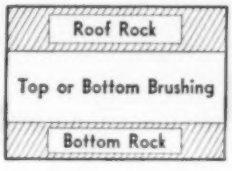
Foreign Developments

GREAT BRITAIN—Discovery of a new coal field near Lichfield, Staffordshire, England, believed to contain at least 400,000,000 tons, has been officially reported by the British government. The announcement stated that the newly found deposits might prove several times as large as the estimate—possibly totaling as much as 2,000,000,000 tons. The seams lie about 3,000 ft. underground and to date some 30 ft. of coal has been discovered, including seams 8, 6 and 5 ft thick. No decision on working of the deposits has been made as yet and surveying and boring are continuing. Government experts estimate that it will be six years before the area produces coal in any quantity.

AUSTRALIA—A plan by the Standard Oil Co. of Australia, Ltd., to produce 46,000,000 gal of high-grade gasoline annually—11.5% of Australia's consumption—by the lique-

Drill Rock





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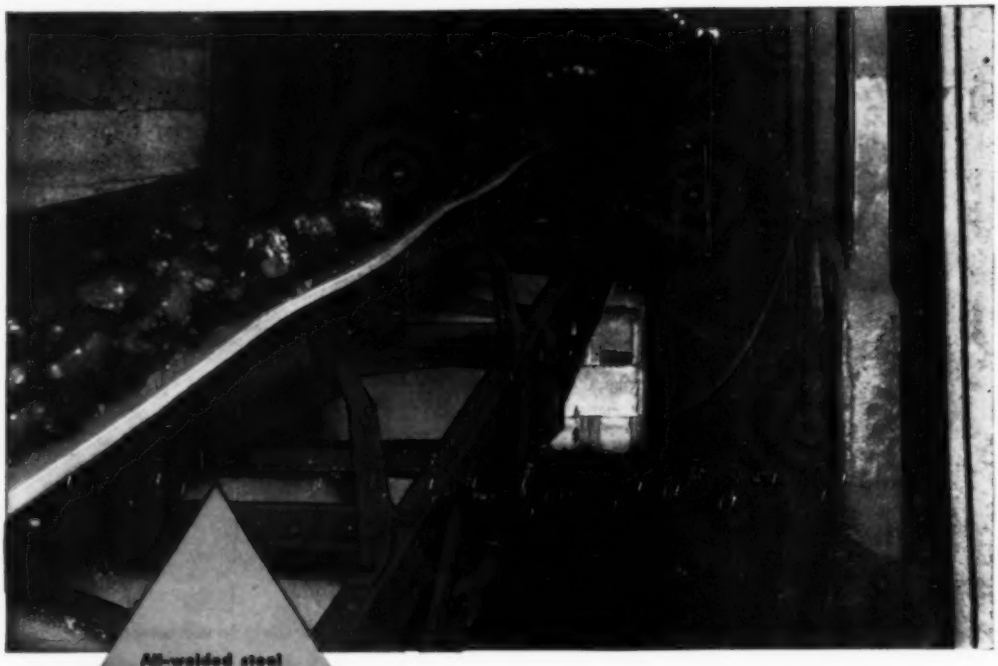

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faction of coal and the cracking of oil shale has been reported from Sydney. Sanction of the Commonwealth Government necessary for the expenditure of $7,000,000 on plant and equipment is being awaited. The proposal calls for a plant at Baerami, near Muswellbrook, New South Wales and it is reported that an American organization has offered a loan of $7,000,000, provided the Australian government furnishes suitable guarantees. The operation is expected to effect a net annual saving of more than $7,000,000 in imports and freight payments, even after royalties and depreciation allowances. Proven coal reserves at the plant site are reported to be sufficient for the production of $175,000,000 worth of gasoline at present value.

CANADA—Membership of a Royal Commission to investigate the Saskatchewan coal industry has been announced by C. C. Williams, Minister of Labor. Prof. J. E. I. Graham, University of Manitoba, will act as chairman, and other members will include Dr. Robert Hoaland, vice president, Nova Scotia Research Foundation and secretary to the Dominion Coal Inquiry in 1945, and Robert C. Carter, Saskatoon lawyer. According to Mr. Williams, the commission will investigate "all problems of and matters pertaining to the coal industry of Saskatchewan regarding economic conditions and development in the interest of the public, the employees in the industry and the industry itself."

Intermediate and high schools in Drumheller, Alberta, Canada, will offer next fall a course in coal mining that will give students eight credits, three more than any other course in the schools. Theoretical part of the course, which is modeled on a similar course given at the Fernie, B. C., high school, will be supplemented by visits to coal mines in the area and practical shop work.

BRAZIL—A Sao Paulo organization reportedly is planning to erect a bituminous schist distillery at Taubate, state of Sao Paulo, to produce 500 gal of gasoline and 1,500 gal of diesel oil daily, together with ammonia, paraffin, petroleum coke, road-paving residues and other byproducts. Foster Wheeler Corp., New York, is to supervise the construction.

INDIA—Coal production in India has shown a steady rise in the last two years, according to information released by the Indian government. Total 1948 output was 30,300,000 tons, as against 29,500,000 in 1947 and 24,000,000 in 1944. In addition to meeting its own needs, India has been supplying coal to several other countries. Pakistan has been importing from India 170,000 tons of coal a month; Ceylon, Burma and other Southeast Asian countries, 85,000 tons. During the last six months, India exported 100,000 tons to Australia and 30,000 tons to Japan. Another 70,000 tons may be sent to Japan shortly.

BCR Marks Year's Advance In Coal-Use Research

CLOSE TO 200 coal-company executives, mining engineers, operating men, coal-sales experts and railroad officials, gathering for the annual meeting of Bituminous Coal Research Inc., in Columbus, Ohio, May 18, heard reports of a year's progress to guard coal's markets by providing better ways to mine and use coal. Also, they spent an hour or more inspecting new burning equipment for homes, industry and railroads currently under development or test at Battelle Memorial Institute, where a major part of BCR's research and testing is being carried on.

Addition of five new coal-company members and one new railroad member was announced at the meeting, bringing supporting membership for general research and locomotive and mining development to a total of nearly 375, counting twice or three times those organizations that are backing two or more phases of the program.

With J. B. Morrow, vice president, Pittsburgh Consolidation Coal Co., Library, Pa., and president, BCR, presiding at the preliminary business session, and H. A. Glover, vice president (sales), Island Creek Coal Co., Huntington, W. Va., and chairman, BCR Sales Advisory Committee, presiding at the research meeting, BCR directors, project chairmen and others reported as follows, in brief:

Dr. C. J. Potter, president, Rochester & Pittsburgh Coal Co., and member of the executive committee, BCR—Negative results obtained by research, in showing what cannot or should not be done, often are as important as positive results. With increasing competition, coal's research program should become more intensive. In Dr. Potter's absence, his remarks were read by Mr. Glover.

M. L. Patton, vice president (sales), Truax-Traer Coal Co., and member of the executive committee, BCR—In addition to research, which must be geared to the changing relationship of coal to its production and utilization, BCR must perform service functions that include fund raising, liaison with equipment manufacturers and coal-using industries, maintenance of contact with coal producers, distribution of research reports and legal activities.

E. C. Payne, consulting engineer, Pittsburgh Consolidation Coal Co., and chairman, BCR Motive Power Committee—Studies are proceeding to improve air supply and distribution for better combustion in locomotives, boost the quality and performance of locomotive fuel and develop equipment to reduce stack losses and cinder emission. Mr. Payne cited increased economy and efficiency obtained by using double-screened coal.

C. F. Hardy, Appalachian Coals, Inc., and chairman, BCR Hand-Fired Heating Equipment Committee—About 2,000 smokeless heaters of BCR design were sold in 1948. Though there have been no complaints about smoke from these units, some failures of refractory arches and grates have been reported, as well as some cases of excessive soot formation. However, these have been corrected. Most recent development is a new-type smokeless cooking range using coal.

F. K. Prosser, Norfolk & Western Ry. Co., and chairman, BCR Residential Stoker Committee—Newest development, still subject to field tests, is the Down-Flow stoker-boiler for home use, a bin-feed ash-removal unit burning a wide range of coals, with coal and air entering the combustion chamber from the top. Tests also have been made on performance and fuel adaptability of commercial ash-removal stokers and field-trial models.

V. G. Leach, Peabody Coal Co., and chairman, BCR Industrial Utilization Committee—In the industrial field, the development of labor-saving equipment is coal's best hope for a continuing strong market. Since fly-ash collection also is a big problem in this field, a dust collector in the medium-cost bracket must be developed. New research is being aimed at an automatic boiler unit that will match the cost of equipment burning other fuels and will burn coal without smoke or floy ash. Publications of a small booklet, "How to Cut Small Boiler Plant Costs by Mechanical Coal and Ash Handling," was a major achievement during the past year.

John Mitchell, Eastern Gas & Fuel Associates, and chairman, BCR Gasification and Carbonization Committee—Work is proceeding at Carnegie Institute of Technology, Massachusetts Institute of Technology and Battelle Memorial Institute looking to improved gasifying methods and equipment, as well as better carbonization, coke quality and chemical production.

H. F. Hebley, Pittsburgh Consolidation Coal Co., and chairman, BCR Committee on Coal Preparation, Drainage and Waste Disposal—The industry needs more information on dryer design and operation, though BCR recently has published thermal-drying data obtained at a number of plants. Problems of mine drainage are being studied, with BCR collaboration, at the University of West Virginia and by the U. S. Bureau of Mines, Pittsburgh, Pa.

R. A. Jones, Research Associate Professor of Architecture, Residential Planning Project, University of Illinois—Plans have been developed for homes using solid fuels to provide

Ohio Group Honored for Conservation Work

THE OHIO RECLAMATION ASSOCIATION last month was honored with the President's Award of the Western Reserve Chapter of Friends of the Land "in recognition for an outstanding contribution to the advancement of public knowledge concerning the vital conservation problem." George Usher (right), the president making the award, is shown presenting the certificate to Larry Cook, executive vice president of the Association. In the process of restoring to productive use the surface areas of more than 70 member strip-mine operators in Ohio, the group has become the state's largest tree planters, setting out more than 1¼ million seedlings this spring alone.

for easy fuel delivery, convenient fuel handling and simple ash removal. A booklet, "Homes Planned for Coal or Coke," will be published in June by the Small Homes Council, University of Illinois.

R. A. Sherman, assistant director, Battelle Memorial Institute—Among some 30 associations supporting work at Battelle, with total cost running to about $5,750,000 per year, BCR sponsors the largest program. A sound research program has two basic needs: wisdom in the selection of specific projects, and patience and understanding by the supporting group. Research results will be used more widely if coal companies spread the word through their advertising and their salesmen.

Gerald Von Stroh, director, BCR Mining Development Committee—Progress is being made in development of a continuous miner that will mine seams as thin as 28 in. Studies also are being made to gear service operations to the speed of the continuous miner (*Coal Age*, June, 1949, p. 106).

K. A. Browne, Chesapeake & Ohio Ry., and chairman, Mechancial Advisory Group, BCR Locomotive Development Committee—Progress in the past year includes improvement of the durability of combustors, with combustion efficiencies of approximately 98% being obtained; successful fly-ash removal; elimination of after-burning in the separators; and comparison of atmospheric and pressurized feeding. Coal now is being mechanically pulverized. Standing shop tests soon will be run on gas turbines being built by the Allis-Chalmers Co. and the Elliott Co. Also, combustion tests will be run on the Houdry gas turbine, loaned by the government, and on an ash-collection system being developed at Fontana, Cal. Several years still will be required to complete the locomotive development.

At the luncheon meeting, B. R. Gebhart, vice president (sales), Chicago, Wilmington & Franklin Coal Co., Chicago, warned coal men not to become so absorbed in the problems of the present that they cannot come to grips with the promise of the future. The long-term success of research, he pointed out, will be measured in increased sales of coal, which will depend upon whether industry leaders capitalize on the tools BCR is making available for selling more coal. Mr. Gebhart urged executives and sales directors (1) to increase the pressure behind promoting and marketing new BCR developments, (2) to distribute BCR literature to salesmen and customers promptly and to fix responsibility for further distribution and follow-up and (3) to keep the company engineering staff informed fully about research advances and developments.

Safety Trophies Awarded For 1948 Achievements

"Sentinels of Safety" trophies signifying outstanding safety achievements in 1948 have been awarded to the leaders in six classes of mineral operations attaining the best injury records in the 24th annual National Safety Competition under the auspices of the Bureau of Mines, James Boyd, director of the Bureau, announced May 19.

The trophies, donated by the *Explosives Engineer* magazine, are held by the winning companies for one year and each of the employees of the six winning companies have been given a Certificate of Achievement in Safety by the bureau. Certificates of Achievement also were awarded by the Bureau to the 100 mines and quarries for above-average safety performance during the year.

Winner of the trophy among underground anthracite mines was the Hunter Tunnel mine, Philadelphia & Reading Coal & Iron Co., Ashland, Pa., with 127,974 man-hours worked without a lost-time injury.

Taking the trophy for underground bituminous mines was Reliance No. 7 mine, the Union Pacific Coal Co., Reliance, Wyo., with 383,888 man-hours worked without a lost-time injury.

Awarded Certificates of Achievement for injury-free records or for ranking 2d, 3d, 4th and 5th in their respective groups were the following coal mines:

Anthracite mines: Butler mine, Jermyn-Green Coal Co., Pittston, Pa.; Pine Ridge mine, The Hudson Coal Co., Wilkes-Barre, Pa.; Pittston mine, P. & J. Coal Co., Pittston, Pa.; and Loree Nos 2, 4 and 5 mines, The Hudson Coal Co., Plymouth, Pa.

Bituminous mines: No. 11 mine, The Union Pacific Coal Co., Rock Springs, Wyo.; No. 12 mine, U. S. Coal & Coke Co., Anawalt, W. Va.; Rockhill No. 1 mine, Rockhill Coal Co., Robertsdale, Pa.; and Winifrede mine, Pond Creek Colliery, N. & W. Ry. Co., Williamson, W. Va.

Open-pit mines: Seeley mine, Forsyth-Williamson Coal Co., Williamson, Ill.

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BCI Picture Book Available to Public

A new picture booklet designed primarily as an addition to the growing list of educational materials distributed to teachers and students has recently been completed by Bituminous Coal Institute. Profusely illustrated, the booklet graphically describes in simple language the many phases of bituminous coal mining, industry activities and its varied equipment.

First printing of the booklet totaled 100,000 copies. Member companies that desire quantity lots for distribution through their own channels may secure copies from BCI at cost.

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"Everything was wrong on this job. When I arrived the superintendent and the operator were having a terrific argument. The 'Super' claimed that the operator was wearing out wire rope twice as fast as anybody else on the job. The operator blamed the machine. I could see that nobody knew the real source of trouble.

"I offered to give them a complete check-up and they both jumped at the chance. It turned out that they were using cast iron sheaves which were too soft. To make it worse, the wire rope was not preformed and tended to twist and squirm as it passed over the sheaves.

"The rope bit into the sheaves and the sheaves got rough and chewed up the rope.

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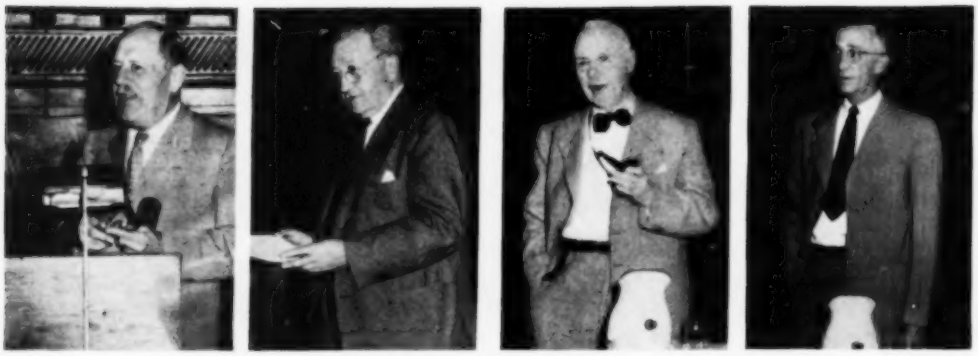

SPEAKERS AT NCA REGIONAL MEETING held in Lexington, Ky., included: Chas. A. Owen (left), president, Imperial Coal Corp., and NCA president; John D. Battle, NCA executive vice president; Calvin Holmes, president, Holmes-Darst Coal Corp., and NCA director; and Charles A. Griffith, president, Southern Coal & Coke Co., and NCA director.

ALSO PARTICIPATING IN THE MEETING were George P. Fitz (left), president, Hazard Coal Operators' Exchange, who presided at the forenoon session; and R. L. Stearns Jr., vice president, Stearns Coal & Lumber Co., and NCA director, who addressed the group.

PRESENTATION OF A RING to Robert Dickson (right), safety director, Kentucky River Mining Institute, by John D. Battle, NCA executive vice president, in recognition of Mr. Dickson's safety achievements, was a feature of the day-long meeting.

National Coal Holds First Regional Meet

MORE THAN 70 OPERATORS and members of local coal associations gathered at the Hotel Phoenix, Lexington, Ky., June 9, to hear officials and directors of the National Coal Association report on the activities, accomplishments and plans of the organization, in the first of a series of regional meetings planned for various sections of the country.

Sounding a warning to the coal industry—and other industries—to take a more active part in the affairs of government, John D. Battle, executive vice president of the association, declared:

"Businessmen are going to take an active, and I mean active, part in the affairs of local, state and national government. Americans for 150 years supported their national government and kept it out of local affairs; by that system we became the richest nation in the world. Now people are asking the government to support them."

Mr. Battle said the present road being taken in Washington "leads to the left, to socialism, and all the other isms." He added that "we can sit on the sidelines and wait for something to happen, or we can go to work, and pay as much attention to the affairs of government as we do to our own business. If we don't," he warned, "we won't have any business to manage."

He had "great faith in the coal industry," faith in those who had built it up to its present position as the greatest in the world, and that "a man who doesn't have faith in the coal industry should get out of that industry," he maintained.

Continuing, he said: "Let's keep the record straight. This nation has never been denied coal by any action of the coal operators. Such shortages as have occurred have been by action of the union. It cannot be forgotten who called strikes while the nation was at war. That is a black mark against union leadership—or misleadership—that can never be erased from the books."

In reviewing activities of the NCA, which, he said, was "created in the first World War by necessity, and has lived since then by service," Mr. Battle pointed to the work being done by Maurice Cooper to interest universities in training mining engineers; the work of Earl Maize as safety director; the work of the Bituminous Coal Institute in the public relations and advertising field; and the work of

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Ohio Reclamation Group Sponsors Conservation Contest

WINNER OF THE OHIO RECLAMATION ASSOCIATION'S school essay contest, "Why Ohio Needs Trees," Donald Lee Moody, sixth-grader of Frazeysburg, Ohio, is presented with a gold wrist watch by Larry Cook, executive vice president of the Association, at a luncheon at the Hotel Cleveland attended by conservation leaders, the press and coal-mining officials. Miss Josephine Bay (right), the teacher who sponsored Donald in the contest, received a scholarship to the Ohio Conservation Laboratory. The Association established the essay contest this year and opened it to any student participating in the Arbor-Day ceremonies held in over 400 schools in 29 Ohio counties with trees provided by the Association for the purpose. This was the third year that the Association had made trees available to schools in an effort to focus attention on the importance of tree planting.

the various committees and staff of the National.

For his outstanding record in safety, Robert Dickson, safety director Kentucky River Mining Institute, Hazard, Ky., was presented by Mr. Battle with a silver ring.

Charles A. Owen, president, Imperial Coal Corp., and NCA president, reviewed the magnitude of the work being done by NCA, declaring that "it is difficult to evaluate in dollars and cents what the NCA is doing for us." From small beginnings, "it has grown and grown," Mr. Owen said, adding that "it has always lived well within its budget." Noting that NCA "is very serious about keeping government out of business," Owen said "we want the country to progress, and we want reclamation projects, but we don't want them on a socialistic basis."

In his progress report on NCA's Coal Heating Service Division, Manager J. Nelson Stuart noted the significant gains in retaining and enlarging the retail coal markets in those areas where CHS was operating. He pointed out that real estate developments in Knoxville, South Bend and other places, had been built with coal-burning equipment through the efforts of CHS groups. He stressed that retail members of CHS were being schooled to sell the advantages of coal burning equipment now available."

"Coal Heating Service," Mr. Stuart declared, "is a sound, practical medium for meeting the problems" that lie ahead for the coal retailer. He said that $600,000 is being spent for advertising in the daily press and that this advertising is "reaching 10 million persons weekly." CHS advertising, he pointed out, "is stimulating a sizable amount of advertising on the part of the individual retailer."

Ralph C. Mulligan, director, Bituminous Coal Institute, discussed the many BCI activities designed to develop a friendly public attitude toward the coal industry and to replace prejudice with facts.

Mr. Mulligan noted the great activity of the BCI Speakers Bureau, commenting that more than 300 volunteer speeches had been made in all parts of the country during the current season. The Speakers Bureau is staffed by more than 250 volunteer speakers drawn directly from the industry, he said. Mr. Mulligan told of the use BCI was making of radio and press mediums to get across to the people the true story of the progressiveness of the coal industry. He discussed the BCI's national advertising campaign in the magazines and its important influence on public thinking. He pointed to the work being done by the educational department and the vast mailings of literature being sent out—especially to school teachers—each week.

James W. Haley, NCA secretary and general counsel, discussed at length the federal tax problems and their effect upon the coal industry. Haley analyzed the Fair Labor Standards Act, and gave the current position of present and impending Congressional legislation of interest to the industry. While he expressed the belief there would be no general tax increases for the remainder of this year, Mr. Haley was not optimistic about prospects for 1950.

At the forenoon session, presided over by George P. Fitz, president, Hazard Coal Operators' Exchange, four directors of NCA—Charles R. Griffith, president, Southern Coal & Coke Co.; Calvin Holmes, president, Holmes-Darst Coal Corp.; Harry LaViers, vice president, South-East Coal Co.; and R. L. Stearns, Jr., vice president, Stearns Coal & Lumber Co., made brief talks.

At the luncheon, presided over by Mr. Stearns, Judge Charles L. Dawson, of Louisville, Ky., counsel for the Harlan Coal Operators' Association, was the speaker. Mr. LaViers presided at the afternoon session.

In the open forum following the meeting, E. C. Perkins, Appalachian Coals, Inc., Cincinnati, made a brief appeal to the coal industry for cooperation instead of strife. Mentioning the Biblical story of Cain and Abel as a form of competition, Mr. Perkins said "accept the responsibility toward your brother in commercial life." Doing this, he said, would overcome any difficult periods ahead for the coal industry. He also spoke of the fine tools with which the industry was supplied—citing Bituminous Coal Institute, Bituminous Coal Research, Inc., and Coal Heating Service as being "the finest, most progressive things that have happened to the coal industry."

The National Coal Association will hold a second regional meeting at the Brown Palace Hotel, Denver, Colo., Aug. 3. All western coal operators and others are cordially invited to attend.

MEETINGS

- **Mining Society of Nova Scotia: annual meeting, July 11-12, Halifax, N. S., Can.**
- **A.I.M.E.: mid-year meeting, Sept. 25-Oct. 1, Columbus, Ohio.**
- **National Safety Council: 37th National Safety Congress, Oct. 24-28, Stevens, Congress and Morrison Hotels, Chicago.**

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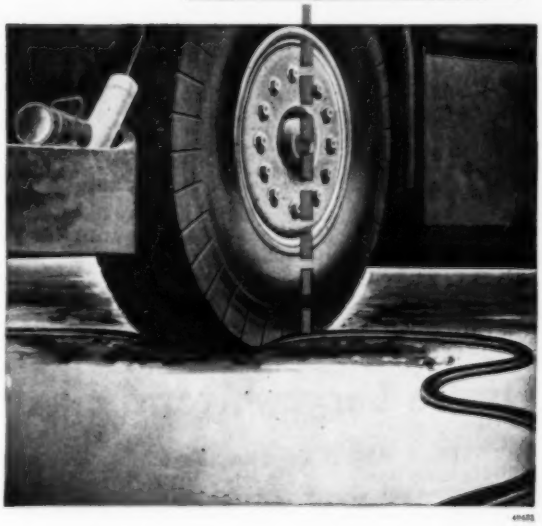
● Because of its patented Anti-Short Breaker Strip (available with or without ground wire) between conductors, Securityflex Parallel Mine Cable can withstand severe impacts with minimum danger of shorting. Adhesion between jacket and insulation —that makes a *solid block* around conductors—helps to give Securityflex its amazing crush-resistance. (Points that mean *greater safety* and *more tons per cable.*)

Other points of interest in Securityflex . . . neoprene jacket protects against flame, abrasion and tearing . . . engineered construction prevents kinking or twisting and stands up longer under extreme overloads . . . cable meets U. S. Bureau of Mines Flame Test and diameter specifications and Pennsylvania Flame Test.*

Specify Securityflex through your Anaconda distributor (all principal cities). Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.



*Insist on mark of *full compliance*—P-102-BM—at 12' intervals on any mine cable you buy.

ANACONDA *Securityflex* **MINE CABLE** ANACONDA

AT THE OPENING SESSION of the West Virginia Coal Mining Institute—C. R. Bourland (seated, left), New River Co., session chairman; and Jesse Redyard, Redyard Coal Co., president of the Institute; Wm. B. Jamison (standing, left), Jamison Coal & Coke Co.; H. A. Glover, Island Creek Coal Sales Co.; C. B. Foster, Truax-Traer Coal Co.; T. R. Workman, West Virginia Coal & Coke Corp.; and M. H. Forester, Pittsburgh Consolidation Coal Co.

AFTERNOON SPEAKERS—Andy Pitney (left), M. K. Mallott Co.; Arch J. Alexander, chief, W. Va. Department of Mines, and session chairman; James Barry, U. S. Bureau of Mines, College Park, Md.; and James L. Gilley, U. S. Bureau of Mines, Welch, W. Va.

West Virginia Institute Draws Large Attendance

CONTINUOUS MINING and roof-bolt suspension were among the subjects featured in a well-rounded program that drew an attendance of 200 to the spring meeting of the West Virginia Coal Mining Institute at the Prichard Hotel, Huntington, W. Va., June 17-18. Jesse Redyard, general manager, Redyard Coal Co., president of the Institute, conducted the meeting and presided at the luncheon. Session chairmen were C. R. Bourland, assistant to the vice president, New River Co.; and Arch Alexander, chief, West Virginia Department of Mines. Human relations was the subject of Dr. Stewart Smith, president of Marshall College, who was the guest speaker at the luncheon.

With G. R. Spindler, head of the West Virginia School of Mines, and secretary-treasurer of the Institute, serving as toastmaster at the dinner, Friday evening, Dr. Allen A. Stockdale, National Association of Manufacturers, spoke on "Let's Build a Better America." Between 5 and 7 pm on Friday, members enjoyed a boat ride on the Ohio River aboard a coal towboat of the American Rolling Mill Co. Inspection trips were made Saturday morning to the local plant of the American Car & Foundry Co., the research laboratories of the BCR mining Development Committee and to the new washing plant of the Truax-Traer Coal Co. at Ceredo, about eight miles from Huntington.

In a paper describing the new Ceredo preparation plant, C. B. Foster, assistant to the vice president, Truax-Traer Coal Co., said that the 750-tph washing plant located on the Ohio River at Ceredo has just begun preliminary operation and many things remain to be done. Its design was predicated on washing metallurgical coals of the No. 2 Gas seam and splint coals from the Dorothy seam. The plant was built by McNally-Pittsburg Mfg. Co. and includes McNally washboxes and Rheolaveur launders. Minus-⅜-in is dried in a battery of Carpenter dryers.

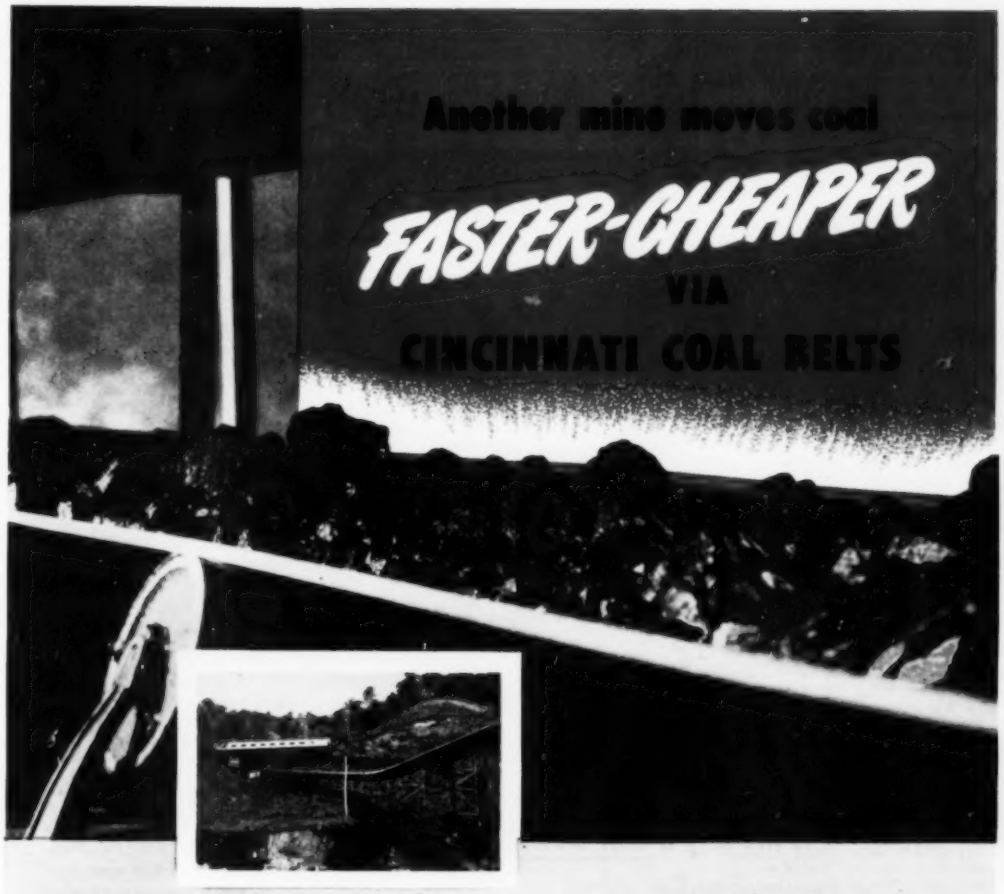
Mining companies must all get back into the groove they got out of some five or six years ago and again work for better and consistent preparation, said H. A. Glover, president, Island Creek Coal Sales Co., in his paper "The Marketing of Coal." Coal must be sold to the retailer on its resale value, Mr. Glover pointed out. A dealer wants good coal consistently and a price cut on a car of bad coal does not make him happy.

Industrial coal is sold mostly on its use value, and if it is intended for pulverized burning, it is sold on Btu content only. Coal for stoker-fired plants is sold mostly on uniformity of size consist, next on burning characteristics and somewhat on Btu value. If with some coals, for example New River slack, a mine operator adds 1% moisture he sooner or later is cutting the sales value of his coal 10c per ton, and even if he corrects the situation his sales department may not get back the original price.

Since there is now a greater supply of stoker coals than of any other size, it behooves the retailers to take an added interest in selling stoker equipment, Mr. Glover continued. Sales and operating departments should know more about each other's problems so as to cooperate to better advantage in the ultimate object of producing a coal that will sell. An operating department can take off nickels and dimes as fast as the sales department can put them on. If a retailer has to degrade coals in the yard, his margin may be much smaller than it appears, he emphasized.

The continuous miner, Mr. Glover said, foretells the passing of lump coal and dealers will have to be taught to sell sizes other than lump and shown how to make money on them.

In opening the symposium on continuous mining, M. H. Forester, vice president, Pittsburgh Consolidation Coal Co., reviewed the early development of the units. He paid special



Cincinnati Coal Belts coupled with mechanized equipment are a "body blow" for high haulage costs at this brand new West Virginia mine.

Cincinnati Coal Belts STEP UP TONNAGE . . . LOWER COSTS. They are vital in modern mine mechanization. On slope lifts . . . in-the-mine conveying . . . exit-to-tipple haulage . . . wherever Cincinnati Coal Belts are on the job, coal moves FASTER and CHEAPER.

MODERNIZE . . . MECHANIZE . . . ECONOMIZE with Cincinnati Coal Belts. Write or wire . . . let a Cincinnati representative tell you more about them.

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CINCINNATI COAL BELTS

IN GOES THE MOL-OUT COMES THE COL! ON 105 TIMKEN BEARINGS!

PHOTOGRAPH COURTESY SUNNYHILL COAL COMPANY.

Public demonstration of the Colmol at the Sunnyhill Coal Company's strip mine, New Lexington, Ohio.

Like its namesake of the animal kingdom, the Colmol burrows for a living! It is literally a coal mole!

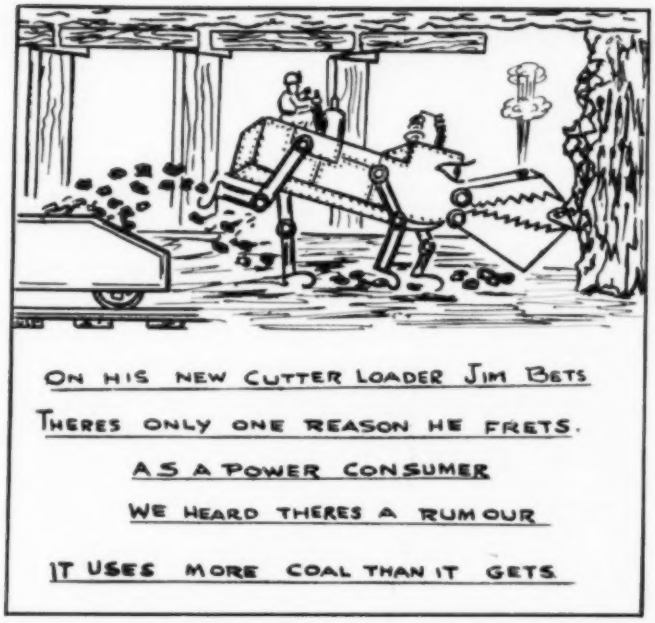
This sensational machine already has aroused nation-wide interest and has received wide publicity because it represents a revolutionary development in coal production. In recent field tests it produced more coal in less time than ever had been done before. The operator estimates that the Colmol will be able to mine and load 500 to 1,000 tons of coal a day in regular production.

It is characteristic of Timken tapered roller bearings to find them associated with outstanding developments in industrial and transportation equipment of all kinds—and has been for nearly 50 years. Thus a total of 105 Timken bearings is used in the Colmol to assure smooth, frictionless operation at all speeds; to simplify lubrication; to carry radial, thrust and combined loads; and to hold rotating parts in correct and constant alignment. The bearings are applied at the following positions: 48 in the cutting head, 20 in the timing gear, 24 in the track transmission, 7 in the conveyor drive, and 6 in the conveyor idler.

Timken bearings contribute importantly to outstanding performance, endurance, economy and long equipment life wherever they are used. Make sure they are used in the machines you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

TIMKEN
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ⊂⊃ AND THRUST ⊂⊃ LOADS OR ANY COMBINATION


ON HIS NEW CUTTER LOADER JIM BETS
THERES ONLY ONE REASON HE FRETS.
AS A POWER CONSUMER
WE HEARD THERES A RUMOUR
IT USES MORE COAL THAN IT GETS

Mechanical Mole—Australian Model

THIS DESIGN of a "new-type" cutter-loader and the accompanying verse comes to us from J. B. Robinson, master mechanic, Australian Iron & Steel, Ltd., Port Kembla, Australia, who has been on a several months' tour of the United States studying coal-mining methods. The drawing and verse were presented to Mr. Robinson by fellow workers at a mine Christmas party last December, where it was projected on the screen for the enjoyment of those attending. Mr. Robinson's work for some months on a design of a new cutter-loader prompted his associates to conceive this mechanical mole.

tribute to Mr. McKinlay, whose entry loaders went into use in 1920, with some in practically continuous use in Illinois to this day. One Colmol and about 25 Joy continuous miners now are in operation, Mr. Forester said. The Joy machines are made in two models, 34 and 48 in and Mr. Forester said that perhaps we can take a lesson from foreign countries, which have taken special pains with surface preparation and have been less concerned with size consist in relation to underground methods.

W. B. Jamison, chief engineer, Jamison Coal & Coke Co., one of the symposium-panel members, described the results of driving 15-ft entries with shuttle cars and a 48-in Joy continuous miner in a mine taking 7 ft of coal in the Pittsburgh seam in northern West Virginia. Numerous problems encountered have prevented making consistently good records. Production has ranged from 0 to 75 tons per man-day, but Mr. Jamison believes that with the improved Joy machine, which is now or presently will be available, a five- or six-man crew in that mine can average 350 tons per shift. The principal limitation is taking the coal away from the miner.

The quantity of plus 5-in obtained with the miner is about the same as with a conventional mobile loader, Mr. Jamison said. There is somewhat less 2x5-in and 1½x2-in, slightly more ¾x1½-in and more slack. Dull bits and an inexperienced operator can greatly increase the percentage of fines. Usual power peaks for the machine have ranged from 100 to 120 kw, while the maximum peak encountered so far without tripping the relays was 156 kw. Dust control has been only moderately successful, although the machine is equipped with sprinklers operating at 150 psi and an exhaust practice is used with other sprays to settle the dust in an adjacent place. The top is sounder because of the absence of shooting.

T. R. Workman, vice president, West Virginia Coal & Coke Corp., another panel member, prefaced a discussion of his company's experience with a Joy continuous miner with mention of a survey of a few years ago in which the lump-coal market was found to have decreased only 1% in the previous 10 years, and he pointed out that the industry cannot overlook the lump market. Demand for egg also is good, he said. The low-type Joy continuous miner has been used in the 48- to 56-in upper split of the Cedar Grove seam, which is a hard coal to break. The machine has had some difficulties but has achieved up to 28 tons per man-shift.

Size consist has not been satisfactory from present-day marketing standards, he said. This machine has been returned to the factory for redesign and Mr. Workman expressed the belief that the revised version can be applied in certain seams of coal, with a clean seam of metallurgical coal particularly its field. Regarding the question of dust control and sprinkling, the industry will be forced to install pre-drying ahead of dry-cleaning systems, Mr. Workman feels. His company will continue to try to improve the conventional mechanical-loading methods and at the same time will help to improve the continuous miner, he stated.

James Hill, Sunnyhill Coal Co., the fourth panel member, described the Colmol continuous mining machine (*Coal Age*, December, 1948, p. 84) now being marketed by the Jeffrey Mfg. Co. The one unit, which has been tested in several seams of coal and has produced 6,000 tons to date, now is at the Jeffrey factory for improvements. Sizes of two of the four motors have been increased, maximum tramming speed has been increased to 35 fpm and the hydraulic drive is being improved.

At a mine in northern West Virginia, the Colmol, driving rooms 14 ft wide and 300 ft deep, produced 486 tons in one day when the machine actually operated only 161 minutes, indicating an average of 3 tons per minute. Delay time was largely due to inadequate haulage—a shortage of shuttle cars. The big problem has been to haul the coal away from the machine. In this mine, the machine advanced the room 9½ ft wide for 25 ft, then backed up to take an additional 4½ ft for that distance.

Timbering is another big problem, and if a way is found to take the coal away from the machine at an adequate rate, it will require three men to keep the face timbering up, Mr. Hill stated. He urged operators to receive the new continuous-mining machines with an open mind and to give them the benefit of the doubt.

A total of 114 mines now are using roof bolts or have placed orders for them, and in the past two years 80 miles of mine passageways have been bolt-supported, reported James L. Gilley, U. S. Bureau of Mines, Welch, W. Va., in a discussion on "Roof Bolts for Mine-Strata Control." A. J. Barry, U. S. Bureau of Mines, College Park, Md., also was scheduled to discuss suspension bolting with Mr. Gilley, but lack of time prevented hearing from Mr. Barry.

Slides shown by Mr. Gilley included sketches of bolts set at an angle, but

he pointed out that bolting is being done in many other ways. As yet the right combination has not been determined, he said. In discussing bolt size, he admitted that the 1-in bolt is perhaps somewhat oversize, but stressed that the safety factor is a favorable asset.

Timbers, said Mr. Gilley, do no work until the rock breaks. Before a mine begins to depend on bolts, it should be determined that the bolts are held in such a manner that they cannot be pulled out. A large coal mine in Alabama utilizes roof bolts 100%, and one operator reported roof bolting reduced the accident severity rate from 21 to 6, he said. While some failures have occurred, the total experience of the past two years fully justifies the bolting method, he maintained. The Bureau is developing an instrument to look up into drillholes to determine how much strata separation has taken place.

Answering a question from the floor, Mr. Alexander said that his department does definitely approve of roof bolting where it can be applied. Discussion on obtaining clearance under bolt heads in 36-in coal brought out suggestions of drilling to accurate depths, countersinking and rubber protectors on the bolt heads.

Speaking on "The Price of Being Without Public Relations," Andy Pitney, M. K. Mellott Co., Pittsburgh, said that something deeply wrong is indicated when coal mining can pay the highest wages of any industry and still be tagged a bad industry. To gain goodwill, an industry must be willing to subject itself to public scrutiny, the business must be organized in the public interest and it should compete for public goodwill.

The poor public relations suffered by the coal industry, as indicated by unfavorable magazine articles and other evidence, do not result from any one failure but rather from many failures in the past, and such poor public relations cannot be corrected by one master stroke, Mr. Pitney said. Affiliation with local community movements is a good way to start better relations. Such activities outlined by Mr. Pitney included scholarships, close contact with high schools, provision of better surroundings and favorable publicity from the introduction of new machinery and facilities.

Dr. L. D. Schmidt, supervising engineer, Research Station, U. S. Bureau of Mines, Morgantown, W. Va., in his paper "Underground Gasification of Coal," used slides to show sketches of the laboratory-scale experiments made in Morgantown and the field work now under way at Gorgas, Ala. (*Coal Age*, March, 1949, p. 120). The fire, lighted early in March at Gorgas, has been maintained between Borehole No. 1 and No. 2 but as yet no combustible gas has been made. As the experiment progressed, certain difficulties appeared and are being rectified. Upon the advice of firebrick experts the mine was allowed to heat slowly and this now appears to have been a mistake, he stated.

Dr. Schmidt described the Russian experiments in underground gasification of steeply pitching seams and reported that the experiments now going on in Belgium and the French experiments about to begin in Africa are both in steeply pitching seams. Gasification of steeply pitching seams provides natural circulation, in contrast to the forced circulation necessary in the flat seam at Gorgas.

EQUIPMENT APPROVALS

Six approvals of permissible equipment were issued by the U. S. Bureau of Mines in May, as follows:

Joy Mfg. Co.—Type WK82 air compressor; one motor, 30 hp., 250 and 500 volts, dc.; Approvals Nos. 2-667 and 2-667A; May 3.

Greensburg Machine Co. — Type MTP-620 timbering machine; one motor, 15 hp., 250 volts, dc.; Approval No. 2-668; May 11.

Goodman Mfg. Co. — Type 120 Conway shovel; two motors, 20 and 5 hp., 230 volts, dc.; Approval No. 2-669; May 20.

Goodman Mfg. Co.—Type 90-L elevating conveyor; one motor, 10 hp., 230 volts, dc.; Approval No. 2-670; May 31.

Wolf Safety Lamp Co. of America, Inc.—Junior Model lamp; Approval No. 210; May 6.

Bisch Industries, Inc. — Single-shot blasting unit; Approval No. 1228; May 4.

Anthracite Quality Label Now Required by Law

Amendment of the Anthracite Standards Law by the 1949 Pennsylvania Legislature makes it mandatory, effective Sept. 1, that anthracite producers and Pennsylvania dealers label all sizes of anthracite from broken to rice, inclusive, as either "Standard Anthracite" or "Substandard Anthracite." As a Pennsylvania law, the amended statute does not apply to out-of-state dealers but does compel producers to label their product correctly regardless of shipping destination.

The original law, effective Sept. 1, 1947, was initiated by anthracite producers and permitted, but did not require, such labeling. The recent amendment was proposed by producers to provide consumers with a means of determining whether they are receiving a quality product. It is expected that the service and protection resulting will be reflected in greater consumer acceptance of anthracite. While more than 90% of the legitimately prepared anthracite shipped to market conformed to standards fixed by law in the past, the small percentage of substandard anthracite damaged the industry's reputation as a whole.

The industry hopes that similar legislation will be enacted in other states in the anthracite-consuming territory so that dealers in those states will be obliged to pass along to their customers the certification of quality they are receiving from anthracite producers. To assist in the development of such legislation, the Anthracite Committee is making legal advice available to all dealer groups who desire it.

Illinois Mines Bureau Reorganization Sought

Reorganization of the Illinois state department of mines and minerals to permit more efficient administration of laws providing for the health and safety of coal miners was requested June 6 by Governor Adlai E. Stevenson.

In a series of bills presented to the state legislature, the Governor seeks to transfer the administration of health and safety laws from the state mining board to the department and to place the responsibility for the conduct and affairs of the department entirely in the hands of the director of mines and minerals. Currently, the responsibilities in the department are divided with the state mining board, which is charged with administration of the important health and safety laws.

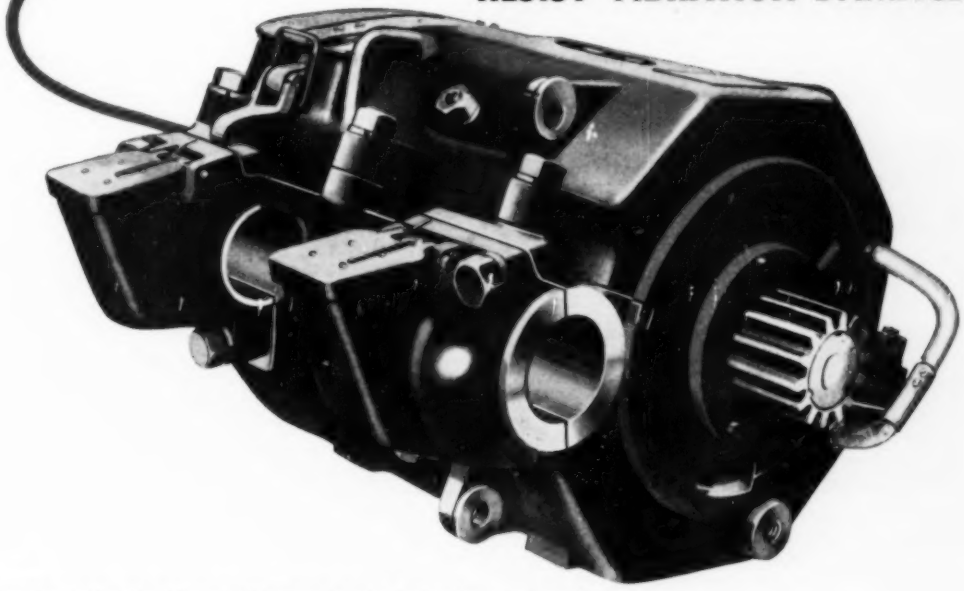
Unanimously endorsed by the state mining investigation commission as well as the administration, the bills also would provide for issuance of certificates of competency by the department rather than the mining board. The mining board, however, will conduct the oral part of examinations for competency certificates. The bills also would create a four-man oil and gas board to act as a consulting and advisory group to the director in the administration of the oil and gas conservation code.

The new legislation would define the duties of the state mining board in respect to interpretation of mining laws, formulation of rules and regulations pertaining to new mining methods, hearing of charges of violations of mining laws and holding oral examinations for competency certificates.

It also would provide for construction of fireproof transformer and generator stations underground; improve examinations of mines and air shafts; require abandoned mines to be completely filled with earth or to be kept securely enclosed and sealed; provide for four mine rescue stations and mobile rescue units; and reduce the membership of the mining investigation commission from nine to five members.

Welded by National—

YOUR MINE LOCOMOTIVE FIELD FRAMES RESIST VIBRATION DAMAGE



More than half of the failures which occur in mine locomotive motors are from mechanical, rather than electrical, causes. Mechanical failures develop most often from misalignment and a lack of rigidity.

The split field frame is particularly subject to vibration and misalignment. It was designed for convenience of repair, but it increased the burden of maintenance tremendously.

At Bluefield, West Virginia, and Grundy, Virginia, we have shops especially equipped to weld old-type split field frames into solid box-type frames. Combined with preventive maintenance—rebuilding motors at pre-determined intervals based on ton miles of service—average maintenance costs can often be just about cut in half. Our Bluefield and Grundy shops are experienced in all phases of mine locomotive maintenance, redesign and repairing.

Welding insures unchanging air gaps. Continuity of the magnetic circuit is made certain. Ball bearing failures are reduced. All in all, length of life is increased, possibility of sudden failure is reduced.

As each motor needs maintenance work, let National build *real* service into it—and start it on a preventive maintenance schedule.

Wherever you are our nearby Field Engineer is available

AT GRUNDY, VA., ADDRESS NATIONAL ELECTRIC SERVICE CORP.

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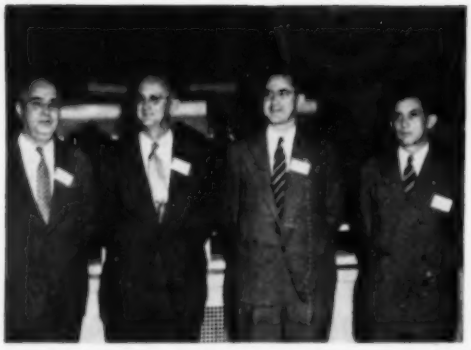

PARTICIPANTS IN THE OPENING SESSION—William A. Staab (left), mining engineer, Calcium Chloride Association, and session chairman; R. H. Allen, general manager, Well Service, Inc., and Section Chairman; Dudley Thompson, assistant professor, V.P.I.; and R. W. Laird, instructor, W. Va. University.

AT THE SATURDAY MORNING SESSION of the Central Appalachian Section, A.I.M.E., meeting—R. H. Allen (left) Section Chairman; William Norris, safety director, Olga Coal Corp.; J. A. Hagy, mine superintendent, Jewell Ridge Coal Corp., and session chairman; and H. E. Mauck, in charge of operations, Olga Coal Co.

SPEAKERS AT THE MINING-EDUCATION SYMPOSIUM—William C. Nelson (left), management consultant; David T. Prichard, 1949 V.P.I. graduate; Veleair C. Smith, consulting engineer and geologist, and session chairman; William N. Poundstone, 1949 W. Va. U. graduate; E. R. Price, general superintendent, Inland Steel Co.; and M. D. Cooper, director of vocational training, National Coal Association.

Central Appalachian A.I.M.E. Discusses Varied Subjects

CHANGEOVER of two "wireless" coal mines to line power, mining education and pre-grouting of shafts were among the subjects specifically pertaining to coal mining discussed at the spring meeting of the Central Appalachian Section, A.I.M.E., June 3-4 at Virginia Polytechnic Institute, Blacksburg, Va., and at the Mountain Lake Hotel nearby.

A paper on ultra-sonic experiments in settling phosphate tailings to avoid stream pollution indicated that the coal industry's problem of pollution by washing plants is slight in comparison. Dr. L. E. Young, president of the A.I.M.E., spoke at the banquet. R. H. Allen, general manager, Well Service, Inc., Charleston, W. Va., chairman of the section, opened the three technical sessions, and the presiding chairmen were: William A. Staab, mining engineer, Calcium Chloride Association; Veleair C. Smith, consulting engineer and geologist; and James A. Hagy, mine superintendent, Jewell Ridge Coal Corp.

The change from on-track battery-operated to off-track line-powered face equipment at the very gassy mines of the Olga Coal Co., McDowell County, West Virginia, was described by H. E. Mauck, in charge of operations for the company. One of the five units of equipment recently received had been operated for three weeks at the time of the meeting. In planning the conversion every effort was made to use permissible equipment and arrive at the safest possible arrangement for line-powered machinery.

Rectifiers have been installed underground to supply 275-volt dc power for face equipment, and the rectifier circuits are not connected with any track rail. As yet, the section and main-line track haulage remains battery operated. It is planned to install intermediate belt haulage and use trolley-locomotive haulage on the main line. The trolley haulage will be confined to intake air and doors will not be used. From the rectifiers, power is taken in rubber cables to junction boxes containing ground relays that open the circuit if a ground current reaches 5 amp.

It has been found that some items of equipment necessary for maximum safety are not available with permissible plates, principally because the Bureau has followed a practice of not granting plates to parts of equipment separately from the whole unit, Mr. Mauck said. Among the permissibility provisions of the Code the one stating that permissible equipment must be maintained in permissible condition is considered by officials of the Olga Coal Co., as being by far the most important. Permissible equipment not properly maintained can be as dangerous, or even more dangerous, than non-permissible equipment, Mr. Mauck pointed out.

William Norris, safety director of the Olga Coal Co., followed Mr. Mauck with a discussion of the methods of maintaining permissibility. The whole procedure is based on careful in-

(*Continued on page* 162)

the P&H's are Teaming Up!

P&H Model 1400 (4 cu. yds.) owned by the Shen-Penn Production Company at Shenandoah, Pa.

A new P&H 1600 (6 cu. yds.) teams up at Shen-Penn in the strip mining of anthracite coal.

In one location after another owners are reordering P&H Electric Shovels to gain important new operating advantages... For example: P&H's independent propel drive. Change from dig to propel is made instantly by merely flicking the master propel switch . . . there are no mechanical complications of transferring of power from one shovel function to another . . . no sliding gears or mechanical clutches . . . no gear shifting. Faster, easier move-ups with P&H's independent propel machinery mean less trouble, less time wasted. The machine keeps in more efficient digging position . . . cuts tonnage costs. Along with Magnetorque drive, it's another important P&H *added value.*

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MINER'S ELECTRIC CAP LAMP

MODEL *R-4*

Entirely new in its refinement of design, while retaining the unique EDISON nickel-iron-alkaline battery principle, the Edison Model R-4 Electric Cap Lamp presents today's maximum values in high performance, unfailing dependability, and years of useful life.

New research and new engineering of every detail, from headpiece to battery case, give the mining industry a cap lamp designed to serve men and management with higher standards of safety and efficiency than ever before available. *Demonstrations? Gladly, without obligation of any kind.*

- ***Positive "Spot" Adjustment***
- ***Floodlight Beam When Required***
- ***Comfortably Balanced Headpiece***
- ***Four-Cell Edison Nickel-Iron-Alkaline Battery***
- ***Welded Steel Cell Containers***
- ***Tough Nylon Plastic Outer Case***

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CONTINUOUS-MINING, FIRE- AND DUST-CONTROL SPEAKERS —M. H. Forester (left), vice president, Pittsburgh Consolidation Coal Co.; W. D. Northover, safety director, Rochester & Pittsburgh Coal Co.; H. C. Howarth, coal-mine superintendent, Experimental Station, U. S. Bureau of Mines; and R. E. Doherty, dust-control engineer, Anthracite Institute.

MINE-SAFETY PANEL—R. G. Lazelle (left), assistant to the vice president, Island Creek Coal Co.; A. J. Alexander, chief, W. Va. Department of Mines; Richard Maize, secretary, Pa. Department of Mines; A. D. Sisk, chief Ky. Department of Mines and Minerals; R. H. Nicholas, safety director, Pittsburgh Coal Co.; and Earl R. Maize, director, safety division, NCA, moderator.

NEW INSTITUTE OFFICERS inducted by P. J. Friel, editor-in-chief (at the speakers' stand) included: president, Stephen Williams, Columbus, Ohio; vice presidents, A. D. Sisk, Lexington, Ky., and J. M. Malloy, Oklahoma City, Okla.; secretary, C. A. McDowell, California, Pa.; treasurer, Dr. J. J. Rutledge, Annapolis, Md.; publicity editor, R. Dawson Hall, Forest Hills, N. Y.; and assistant publicity editor, Lot H. Jenkins, Martins Ferry, Ohio.

Mine Inspectors Stage 39th Annual Meet

SETTING A NEW HIGH IN ATTENDANCE, with over 500 state and federal inspectors, operating men and others registered from 21 states and Canada, the Mine Inspectors' Institute of America met for its 39th annual convention at Pittsburgh, Pa., June 13-15. Those attending heard papers and discussions on continuous mining machines, fire and dust control, suspension roof support, rock-dusting and the status of mine inspectors, and took part in an open-forum question-and-answer period on mine safety. In addition, they were guests of Mine Safety Appliances Co. on a tour through its Pittsburgh plant and at dinner, visited a new 60-in core-drilled ventilation-and-escapeway shaft, 390 ft deep, at the Ontario mine, Hillman Coal & Coke Co., and heard a special general-interest lecture on glass manufacture.

One feature of the three-day gathering was the presentation by J. J. Forbes, chief, Health and Safety Division, U. S. Bureau of Mines, of the Joseph A. Holmes Safety Association "Award for Meritorious Accident Record" to the anthracite division, Pennsylvania Department of Mines, represented by Richard Maize, secretary of that department. In making the presentation, Mr. Forbes pointed out that this was the first Holmes award ever made to a division of a state agency having cognizance of a single industry.

At the opening session Monday morning, with Stephen Williams, chief, Ohio Division of Mines, presiding, W. L. Affelder, vice president, Hillman Coal & Coke Co., Pittsburgh, reviewed 50 years of coal-mining progress, tracing advances in safety, illumination, ventilation, explosives, rock-dusting, mechanical mining, haulage, electrification, and miners' wages, living quarters and working conditions.

Discussing safety advantages and

HOLMES SAFETY AWARD was presented by J. J. Forbes, chief, Health and Safety Division, U. S. Bureau of Mines, to Richard Maize, representing the Anthracite Division, Pennsylvania Department of Mines.

SPEAKERS ON ROCK-DUSTING AND MINE-INSPECTORS' STATUS—P. J. Callaghan (left), bituminous mine inspector (retired), Pennsylvania Department of Mines; James Westfield, acting supervising engineer, U. S. Bureau of Mines, Vincennes, Ind.; G. S. McCaa, bituminous mine inspector, Pennsylvania Department of Mines; Joseph Berer, administrative assistant, West Virginia Department of Mines; and Dabney Ramseur, mine inspector, Alabama Division of Safety and Inspection.

disadvantages of continuous-mining machines, M. H. Forester, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., declared that the continuous miner of today must not only combine the various cycles of face operations of mining and loading but also must be capable of continuous operation and production with a minimum of lost time and lost motion. Earlier continuous miners fell short of their goal because of the high percentage of small sizes produced and lack of a substantial market for those sizes, lack of flexibility and mobility, the unstable financial condition of the coal industry and a widespread resistance to change.

Three types of continuous miners now are in limited service, Mr. Forester said; namely, the McKinlay entry driver, invented in 1922, which can drive curves but not crosscuts; the Joy machine, about 150 of which may be in use in 1949; and the Colmol, which, like the McKinlay machine, uses the boring principle. Any or all of these machines probably will result in improved mine safety, he added, in the following ways:

1. Ventilation—Although release of methane will be speeded, the volume of air needed to dilute it and carry it off will be concentrated in one place or in a very few places under concentrated supervision and continuous checking and control. The use of wing curtains is proving satisfactory for face ventilation with the continuous miner.

2. Dust—New types of nozzles for water spraying will allay dust satisfactorily, with some reduction in the number of nozzles and the quantity of water required.

3. Ignitions—A 50% reduction in the number of electrical tools required, less footage of exposed trolley wire and feeder cable because of concentrated production and elimination of explosives to break the coal down result in greatly reduced danger of fire and explosion.

1949-50 Officers Mine Inspectors' Institute

President—William Stephens, chief, Ohio Division of Mines, Columbus, Ohio.

Vice presidents—A. D. Sisk, chief, Kentucky Department of Mines and Minerals, Lexington, Ky.; A. J. Alexander, chief, West Virginia Department of Mines, Charleston, W. Va.; and J. M. Malloy, chief, Oklahoma Department of Mines, Oklahoma City, Okla.

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Publicity editor—R. Dawson Hall, engineering editor (retired), COAL AGE, Forest Hills, N. Y.

Assistant publicity editor—Lot H. Jenkins, state mine inspector (retired), Martins Ferry, Ohio.

4. Transportation—With face traffic limited to one machine in a place, there is little or no traffic problem. In addition, methods of transportation better adapted to continuous mining at the face may eliminate mine-car haulage except on main lines, thus eliminating most haulage accidents.

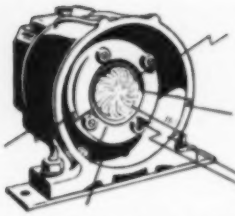
5. Roof—Speed of advance up to 300 ft per shift, the practical limitations in face width and, with the rotary type of borer, the arching along the ribs are strong factors in improving safety. However, a method of support still is needed which will require little or no interruption in machine operation.

6. Illumination—Concentration of production into fewer places probably will encourage development of improved lighting.

7. Manpower—Elimination of cutting, drilling, shooting and loading reduces the number of men needed and therefore the man-hours of exposure to the hazards of mining. At the same time, the need for more highly skilled men as machine operators will raise the level of training and character among mine workers even higher than present mechanization.

8. Supervision — Concentration of several men in one working place or area, though said to be one of the hazards of mechanization, is offset by better opportunities for constant and effective supervision.

Basing his observations on somewhat limited experience with the continuous miner, W. D. Northover, safety engineer, Rochester & Pittsburgh Coal Co., Indiana, Pa., who discussed Mr. Forester's paper, pointed out that the machine's speed of advance may be good or bad, depending on the kind of roof encountered. Where the rock loosens or becomes heavy slowly,



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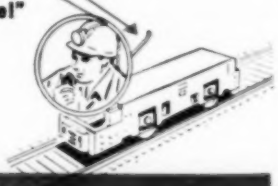

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safety is helped by speedy advance. However, where the immediate roof is drawslate or black jack and is brittle, the problem is more complex, requiring vigilance plus proper and timely timbering. In this operation, vertical hydraulic jacks on both sides of the machine are helpful. "There should be fewer hazards from roof with the continuous miner if proper timbering is done," Mr. Northover declared.

Likewise, since room coal amounts to 80% of total coal mined, simplification of haulage, with one surge-bin shuttle car and another shuttle car moving coal along a straight line to the transfer station, will reduce transportation accidents, Mr. Northover added. Elimination of explosives, use of machine-mounted water sprays to allay dust, improved ventilation to carry off the larger quantities of gas liberated, concentrated supervision and lower manpower requirements all are continuous-miner factors that will improve safety, he concluded.

"Most mine fires are attacked by one of two methods, by cooling or by smothering," said H. C. Howarth, coal-mine superintendent, Central Experiment Station, U. S. Bureau of Mines, Pittsburgh. Mr. Howarth's paper was prepared jointly with John Nagy, physicist, and Irving Hartmann, supervising physicist, of the Bureau's Pittsburgh station. Pointing out that water was adopted as the standard for comparing liquid extinguishing agents and limestone dust as the standard for comparing dry extinguishers, Mr. Howarth and his associates reported on experiments using 12 extinguishing agents on "Class A" fires in a zone 20 ft long with coal burning (1) on the floor, (2) on the floor and ribs and (3) on the floor, ribs and roof of the mine entry. The agents included water, water with wetting compounds added, whitewash mixture, soda-acid, air foam, chemical foam, loaded steam, dry and moist limestone dust, sand, sodium bicarbonate and limestone-coal-dust mixture.

Water was found to be the most effective of the agents and it worked better as a solid steam than as a spray or fog, the investigators declared. Possibly the use of some wetting agents will help extinguish fires in fine coal and coal dust. The time between ignition and attack is of great importance, they added, since mine fires can spread quickly and over a large area if not brought under control immediately. Attack in intake air is better, with the men suffering only from radiant heat. In return air, temperature is much higher and relatively high percentages of toxic and flammable gases are encountered, Mr. Howarth and his colleagues stated.

Because breathing free silica dust over a period of years induces disability and early death, all dust encountered in mining should be feared from a health standpoint and dust-control methods therefore should become an integral part of mining, warned R. E. Doherty, dust-control

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engineer, Anthracite Institute, Wilkes-Barre, Pa. Absence of dust promotes employee morale, boosts productivity and improves safety through better visibility and illumination, he said.

At least 75% of all anthracite-producing companies now are adopting dust-control methods in spite of difficulties, including remoteness of water supply, complex mining systems working as many as 14 veins of coal of varying thicknesses and pitches, the need for workable pressures and, until recently, the scarcity of pipe. Cleaning mine air by electrical precipitation of dust is costly and impractical, and fog sprays reduce visibility, he pointed out.

The most effective and least expensive method now used is: (1) drill the coal or rock face with a wet-type jackhammer; (2) spray the face, ribs and bottom before connecting detonator leg wires to prevent settled dust from becoming airborne by concussion; and (3) after firing, drive out the gases and smoke with a water spray, at the same time wetting the loose coal to permit dust-free loading. Experience has proved that 3 gal of water, properly applied, is enough to make a ton of coal or rock dust-free, Mr. Doherty stated.

Citing the direct relation between silicosis and exposure to dust, Theodore F. Hatch, research director, Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, declared that the first and most important step in preventing this disease is to reduce the quantity of dust released in mining. Mr. Hatch led the discussion of Mr. Doherty's paper. In contrast to hard-rock mining, which releases a high percentage of silica particles in dust, anthracite mining releases a low percentage. Hence, though hard-rock mines have a tolerance of only 5,000,000 dust particles per cubic foot of air for safe operation, the U. S. Public Health Service has concluded that a concentration of 50,000,000 dust particles will eliminate the anthracosilicosis hazard in anthracite mines. However, special care must be observed in driving rock tunnels, in which the percentage of silica in mine dust is likely to be high, Mr. Hatch warned. Even wet-type drills do not eliminate dust, since the amount of dust released varies with the quantity of air which goes down the drill steel with the water.

Significant differences between anthracosilicosis and ordinary silicosis suggest that, after the mechanical problems of dust control are solved, medical research should seek for the causes of those differences, Mr. Hatch declared. There may be some relation between the composition, particle size and other physical and chemical properties of anthracite-mine dust and the nature and course of anthracosilicosis, and it is not enough to assume that general dust reduction is the only needed measure of accomplishment, he concluded.

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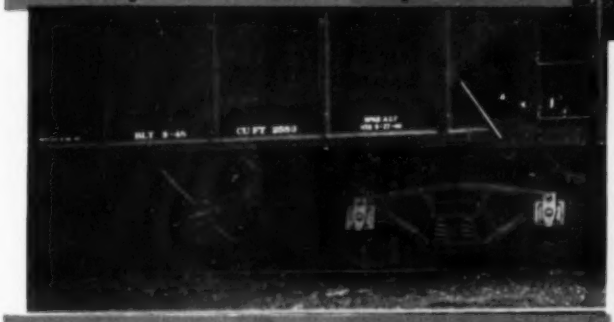

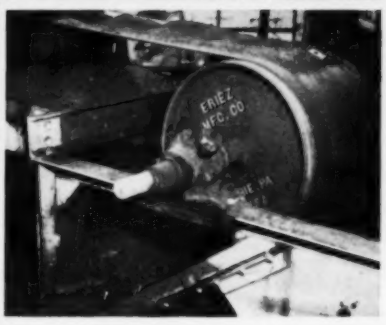

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possible to tie or bind together several thinly bedded rocks to simulate a thick bed, thus providing a competent beam of roof material from rib to rib across an opening to prevent flexure of the immediate roof. This in turn will minimize or prevent falls of roof," declared Arthur Metcalfe, coal-mine inspector, U. S. Bureau of Mines, Fairmont, W. Va., the first speaker at the Tuesday session.

Warning that roof-suspension support for coal mines still must be considered experimental, Mr. Metcalfe estimated that this type of roof support has been installed in more than 50 miles of bituminous passageways in the last two years. The practicability of the system depends primarily on the availability of good anchorage in the strata above the immediate roof, he explained.

Requirements for a roof-suspension project are as follows: (1) suitable drilling equipment, probably a pneumatic stoper drill; (2) a compressor supplying 150 cfm of air at a pressure of 100 to 120 psi; (3) a self-propelled mobile mount for the stoper drill and compressor; (4) either a channel beam with a number of suspension bolts or a single bolt with a steel washer, depending on the structure of the roof strata; and (5) a predetermined pattern for drilling, clean regular holes of a fixed diameter and exact depth, and drill steel tailored for each job.

Installation of suspension supports should be coordinated with the mining cycle, preferably before the coal is cut and as close as possible to the face, Mr. Metcalfe said, and they should be considered permanent roof supports. Reports from several coal companies show that installation time is less than one-third that of conventional permanent timbering and that total cost is less than half the usual timbering cost.

Concluding, Mr. Metcalfe listed 10 advantages of suspension-roof support, as follows:

1. Systematic support at the face, protecting men and machines without the use of easily dislodged posts and crossbars.

2. No danger of dislodging roof supports by blasting or mobile equipment.

3. Smoother flow of ventilating air because of decreased resistance.

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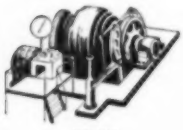
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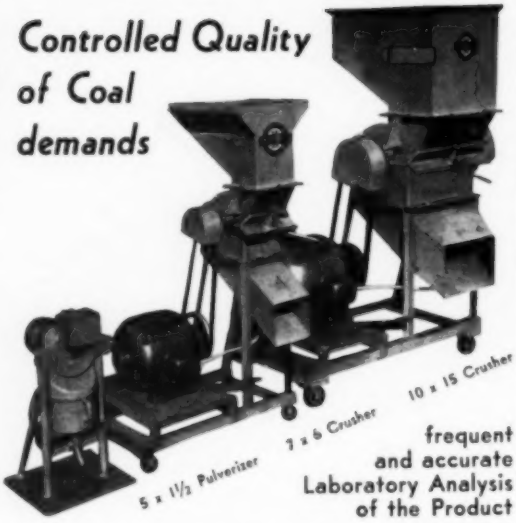

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six-man panel at the Tuesday session were: (1) safe speed for man-trips, (2) use of belts to transport men, (3) stimulation of first-aid training and (4) arousing interest in safety education among supervisors and miners. Earl R. Maize, director, Safety Division, National Coal Association, Washington, D. C., was moderator. Other participants, besides those who took part in the discussion from the floor, were Richard Maize, secretary, Pennsylvania Department of Mines, Harrisburg, Pa.; Arch J. Alexander, chief, West Virginia Department of Mines, Charleston, W. Va.; A. D. Sisk, chief, Kentucky Department of Mines and Minerals, Lexington, Ky.; R. G. Lazelle, assistant to the vice president, Island Creek Coal Co., Holden, W. Va.; and Reese H. Nicholas, safety director, Pittsburgh Coal Co., Library, Pa.

On the question of safe speed for man-trips, Mr. Richard Maize said that in Pennsylvania speeds range up to 15 mph, with most man-trips averaging about 6 mph. He stated that he had no objection to higher speeds providing the man-trip is kept safe. Citing a Kentucky law limiting speeds to 600 fpm for man-trips on slopes or in cages, Mr. Sisk stressed his belief that further laws are impracticable and that the guiding principle should be "a reasonable safe speed." Mr. Alexander reported that two West Virginia mines are permitted to speed man-trips at 20 mph because of heavy rail and special equipment but he contended that, on the whole, speed should be governed by common sense. Mr. Nicholas declared that the man-trip always should be "in control" and supervised by a responsible official.

On the question of permitting workers to ride belts, there was general agreement among the men on the panel that the practice is acceptable, provided proper safeguards are set up, such as rules for loading and unloading, provision for emergency stops, adequate clearance above and at the sides and competent supervision. Mr. Richard Maize, however, warned that company rules, no matter how well thought out and enforced, have no standing in the courts and that coal companies cannot expect the courts to enforce them.

Discussing ways to stimulate first-aid training, Mr. Nicholas attributed the failure of first-aid programs in southwestern Pennsylvania to inertia and outright opposition on the part of the mineworkers' union which has insisted that the companies submit to the union's conditions for a training program. Mr. Alexander reported that in West Virginia the first-aid training program has been uneven, although several mining institutes in the southern part of the state have had some success in sponsoring first-aid meets. Mr. Richard Maize said that anthracite miners are taking an active part in first-aid promotion and that several successful contests have been held among bituminous miners. However, he contended that the union has forbidden miners to participate in

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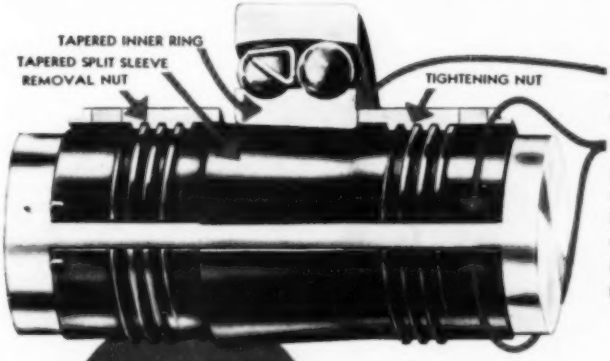

TIGHT FIT results when the tightening nut pushes the tapered inner ring over the tapered split sleeve.

CONCENTRIC GRIP is firm and positive—as the split sleeve contracts and wraps around the shaft. Removal is accomplished by reversing the process—with tightening nut loosened, removal nut pushes inner ring off the sleeve.

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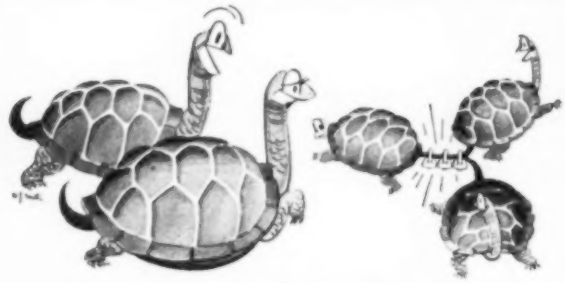

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southwestern Pennsylvania and that the companies should do more to encourage miner participation. To this, Mr. Nicholas replied that the companies already are doing all that can be reasonably expected. As for Kentucky, Mr. Sisk declared that first-aid and mine-rescue training are going along very well and that interest in safety meets is growing.

J. J. Plasky, training and safety director, Red Jacket Coal Corp., Red Jacket, W. Va., speaking from the floor, added that real progress is being made by contacting the local unions personally in the interest of first-aid training and meets and by approaching the miners through their families. He reported that one device to stimulate interest is to publicize wheelchair victims who might have been saved by first-aid treatment or training. Mr. Alexander argued that an approach through local unions had not been fruitful in his experience but that local conditions should determine the kind of approach to be made. Mr. Richard Maize, in turn, warned that his department will enforce a Pennsylvania law requiring that men operating electrical equipment know how to administer artificial respiration. "How these men are to be trained is the operators' problem," he added.

Mr. Lazelle reported that, though first-aid training does not now reach all of his company's workers, it did in years past. The technic now, he said, is to charge foremen with the task of "selling" first-aid training to workers. Speaking from the floor, J. D. Cooner, safety director, The Hudson Coal Co., Scranton, Pa., stated that he meets some resistance among workers but that on the whole his company had had some success with first-aid teams and contests. He now hopes for greater cooperation from the safety director of UMWA District 1.

On the point of interesting supervisors and workers in safety education, Mr. Alexander contended that companies must appeal to the individual personal factors among men. Also, he urged, better use should be made of bulletin boards, supervisors should be better trained in safe work methods, and jobs should be broken down step by step to discover the safety factors involved. Mr. Lazelle suggested that stimulation should come through foremen dealing with workers in small groups—just before the shift starts, for example.

Mr. Sisk, arguing that the foreman is "the forgotten man" of coal mining, baited by inspectors, top management and miners alike, urged that foremen be recertified at regular intervals, say five years, to keep them safety conscious and abreast of new developments. Mr. Nicholas warned that coal companies must keep on plugging safety in spite of discouragement and expressed the hope that eventually union officials would lend their help.

Surveying the present status of state mine inspectors, P. J. Callaghan,

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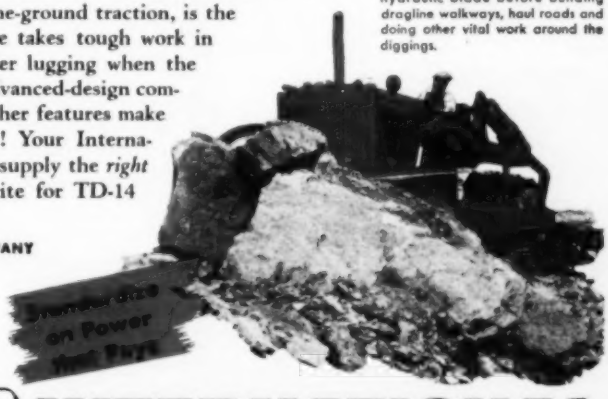

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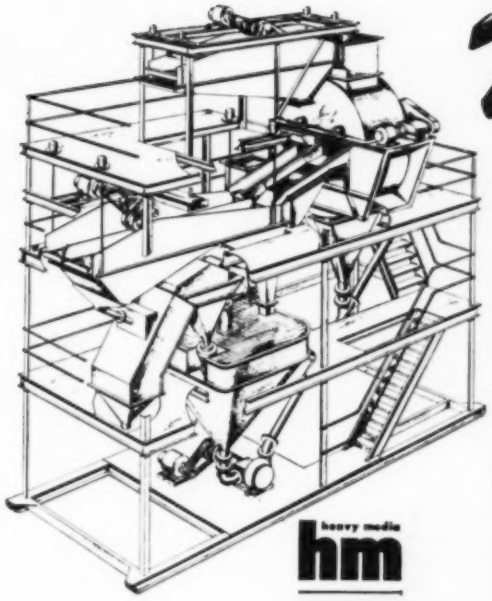
retired Pennsylvania bituminous mine inspector, Bridgeville, Pa., lead-off speaker at the Wednesday session, warned that if state mining laws are defective or inadequate, the inspector is handicapped in spite of his ability and cannot obtain the respect due him by operators, miners and the public. Mine inspectors' salaries range from $2,400 to $6,000 per year, reflecting the various concepts of what an inspector should be, Mr. Callaghan reported.

In drawing up a comprehensive mining code, a state legislature should specify not only operating practices but also the status of inspectors, including their age, citizenship and experience, their civil-service standing, their freedom from political and operating affiliations, the security of their position, their salary and provision for their retirement. In summarizing the codes of some 35 states covering coal and other mining, Mr. Callaghan reported that few legislatures have made adequate provision for inspectors.

The number of lives saved by rock dust in bituminous mines in 1948 can be estimated by (1) comparing the number of men killed in explosions in 1948 with those killed in previous years and (2) by studying the reports on explosions in 1948 to determine the effect of rock dust on the propagation of explosions, said James Westfield, supervising engineer, U. S. Bureau of Mines, Vincennes, Ind. Admitting that controlling dust by water, using permissible equipment and materials and providing electric cap lamps are partly responsible for reducing the number of explosions, Mr. Westfield contended nevertheless that rock-dusting stopped the progress of many explosions in 1948 and thus probably saved the lives of 1,533 men.

The number of mines using rock dust and the quantity applied have increased each year, particularly after a period in which disastrous explosions have occurred, he pointed out. In the three months following the Centralia disaster in March, 1947, for example, mines using water to allay dust increased 210%, mines rock-dusted for the first time increased 1,415% and mines that improved rock dusting increased 600%. Citing specific explosions in 1948, Mr. Westfield declared that rock dusting saved the lives of 469 men in three major explosions, 688 in seven minor explosions and 376 in ignitions in which no lives were lost. Thus, he added, the difference between the number of men killed in explosions in 1948 and the number that might have been killed was not brought about by the absence of ignitions, because ignitions did occur. The reason, he concluded, was that rock dust prevented propagation of the ignition.

"Rock-dusting is an effective means of preventing coal dust from propagating an explosion but it will not prevent gas from igniting explosively and with much attendant damage



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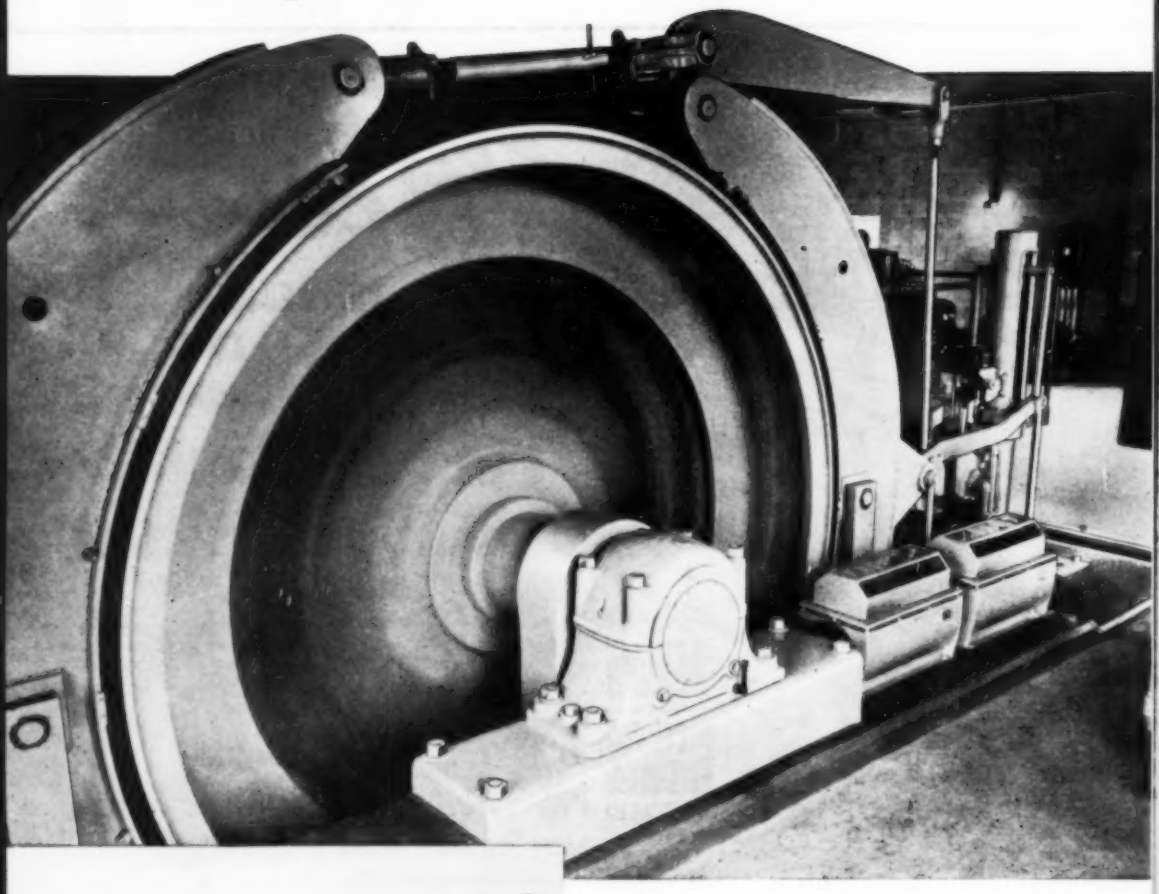

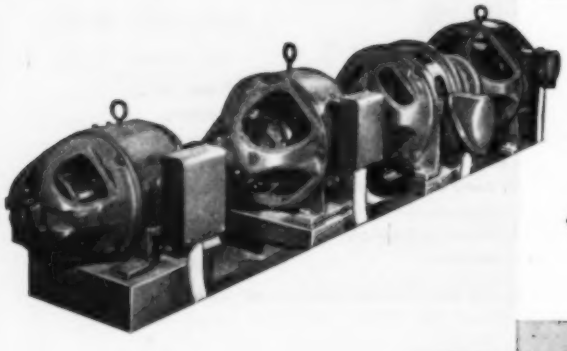

"Operatorless operation" is provided by this new Westinghouse-equipped Automatic Hoist installed in the Green Valley and Wabash Mine of the Snow Hill Coal Corporation. After the hoist is placed in operation at the start of a shift, the automatic control provides continuous hoisting. It moves coal from the hopper onto the weighing pan, fills the skip, travels it upward, dumps it and returns it for another load. The cycle is repeated indefinitely until stopped, or until there is no coal left in the hopper.

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FOR MORE TONS PER MAN-HOUR

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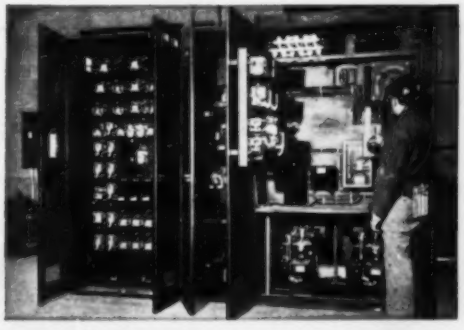
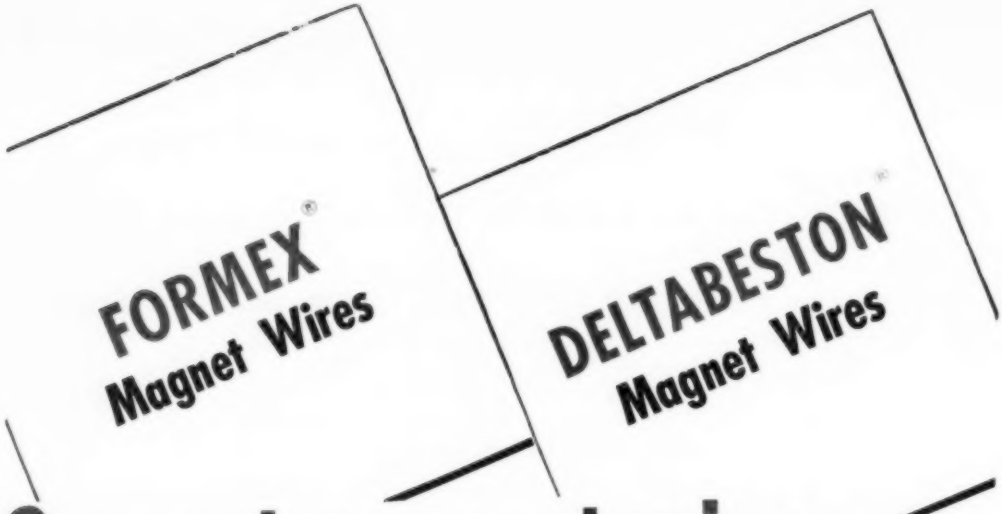
This 1000-kw, 720-rpm synchronous motor-generator set supplies power for the automatic hoist. In the background may be seen the 1250-hp, 450-rpm, d-c motor and the cylindro-conical cable drum with maximum rope speed of 2485 fpm.



The control center unit provides two types of control. (Left) The relay board, containing relays, circuit breakers and contactors, gives automatic operation. (Right) When desired, the operator can operate hoist manually for inspection.



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GENERAL ELECTRIC

locally," said George S. McCaa, mine inspector, Pennsylvania Department of Mines, Pittsburgh, Pa., who discussed Mr. Westfield's paper along with Joseph Bierer, administrative assistant, West Virginia Department of Mines, Charleston, W. Va., and Dabney Ramseur, state mine inspector, Birmingham, Ala.

To prevent the spread of explosions, Mr. McCaa declared that rock dust should be applied in all openings to show at least 65% of incombustible matter and should be maintained in the last open breakthrough, preferably to within the last two cuts of coal at the working face. Some mines, he added, show rock-dust analyses of 70 to 90% of incombustible material and, in addition to dusting by machine once a week, dust daily by hand up to the face and each night by machine in two rotating sections. One coal company has equipped a cutting machine with a small rock-dusting unit so that the rock dust can be applied after each cut is made. Mr. McCaa cited three explosions in Pennsylvania bituminous mines that had been limited by rock-dusting.

Mr. Bierer, who carried on the discussion, noted that management in general had been slow to accept and adopt the use of rock dust in spite of the investigations and recommendations of the U. S. Bureau of Mines and state agencies. Yet, he pointed out, careful study of four ignitions in West Virginia mines in 1948 shows that rock dust prevented the spread of explosions and saved the lives of men working in the mines at the time of the ignitions. In 1948, he reported, 85.6% of all the deep-mined coal produced in West Virginia came from rock-dusted mines. He predicted that in 1949 the percentage possibly would rise to 95%.

Adding a further case history in support of rock-dusting, Mr. Ramseur attributed the adequacy of rock-dusting in the mine concerned to the vigilance of Alabama state mine inspectors, the help of federal inspectors and the cooperation of company officials.

●

Coal Age on Microfilm Available to Libraries

Coal Age is one of a number of McGraw-Hill publications that are to be made available to libraries throughout the country in microfilm form under an arrangement recently made with University Microfilms, Ann Arbor, Mich.

Under the plan, a library will keep printed issues unbound for two or three years, when they are used to the greatest extent. After the paper copies begin to wear out or are not called for frequently, the microfilm containing a year's issue on a single roll is substituted. Inquiries should be addressed to University Microfilms.

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SINCE 1901

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Coal and Business Activity

		1949 to This Date	1949 Over 1948, to Date
Est. anthracite prod., week ending June 11	1,326,000	19,242,000	—26.1%
Est. bituminous prod., week ending June 11	12,960,000	240,608,000	— 6.8%

Source: U. S. Bureau of Mines.

	Bituminous Coal Stocks (Thousands, net tons)			Consumption (Thousands, net tons)			
	May 1, 1949	Days' Supply	Apr. 1, 1949	May 1, 1948	April, 1949	March, 1949	April, 1948
Electric power utilities	23,499	111	22,127	11,745	6,330	7,347	6,919
Byproduct coke ovens	12,914	47	11,452	4,308	8,253	8,513	6,486
Beehive coke ovens	†	†	†	†	1,000	695	389
Steel and rolling mills	1,180	49	1,023	771	714	849	819
Cement mills	1,105	31	984	776	649	666	649
Other industrials	15,092	55	14,554	11,112	8,301	9,918	7,292
Railroads (Class I)	9,296	46	8,908	4,864	6,121	6,565	7,044
Retail dealers	2,098	10	1,463	842	6,131‡	9,784†	4,411‡
Total	65,164	52	60,511	34,448	37,499	44,337	34,011

Source: U. S. Bureau of Mines. †Not available. ‡Retail dealer deliveries.

	Latest Week	Month Ago	Year Ago
Business Week Index of Business Activity, wk. ending June 11	183.9	187.6	195.3
Steel ingot operations (% of capacity)	86.7	95.6	96.0
Electric power output (million kw-hr)	5,300	5,257	5,132
Crude oil production (daily avg. 1,000 bbls)	4,876	4,899	5,480
Misc. & L.C.L. carloadings (daily avg. 1,000 cars)	72	72	84
All other carloadings (daily avg. 1,000 cars)	59	56	68
Prices, spot commodity index (Moody's Dec. 31, 1931 = 100)	340.5	344.2	427.5
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100)	212.9	230.3	276.2
Prices, domestic farm products (B.L.S., Aug., 1939 = 100)	295.2	290.2	394.6
Prices, finished steel composite (*Iron Age*, lb)	3.705c	3.705c	3.211c
90 stocks, price index (Standard & Poor's Corp.)	109.3	118.4	134.8

*Date of latest week for each series on request.

Central Appalachian A.I.M.E.

(*Continued from page* 140)

spection and thoroughness on every repair job, he said. Permissible compartments are opened only in intake air and under supervision of a foreman. Workmen place personal seals on the compartments after each opening, thus fixing the responsibility.

In a paper, "The Application of Churn Drilling in the Controlled Pre-Grouting of Mine Shafts," R. H. Allen, proposed a number of advantages of the churn-drilled hole as compared to the core-drilled hole for pre-grouting. With the core-drilled hole, which may have been standing full of water for days or weeks, he said, the abnormal hydrostatic pressure makes it practically impossible to test for water-bearing strata. With a churn-drilled hole, however, in which only 30 ft or so of water is used at the bottom for drilling, a practically dry hole is available for stage testing and grouting only the water-bearing strata avoids the wasting of grout in thirsty strata that are not water-bearing, Mr. Allen reported. A 15 to 20% saving on a complete job by grouting from churn drilling and a 20% saving in cementing and grouting materials were cited by Mr. Allen.

During the discussion, B. H. Mott, Mott Core Drilling Co., Huntington, mentioned that in 20 years' actual experience in pre-grouting mine shafts through diamond-drill holes he has never heard of any shafts completely dried by pre-grouting through churn-drill holes. Churn drilling with little water creates a mud condition that together with the churning action of the bit plugs crevices, he reported, and his company finds it cheaper to drill diamond-drill holes. The U.S. Engineers have been specifying smaller and smaller diamond-drill holes for grouting and have used holes as small as 1⅝ in in diameter, Mr. Mott pointed out.

Lee Morris, assistant to the president, Warner Collieries, suggested that it may not be economical to try to get a completely dry shaft but instead may be wise to install water rings, since in some cases the water collected is needed. Velear C. Smith, in discussing the point that a churn drill plugs the crevices, said that rotary-drill holes for oil and gas wells are usually tailed in with a churn drill to prevent mudding that might stop the flow. Answering a question, Mr. Allen said that in pre-grouting a pressure of refusal of 2,000 psi is the usually accepted standard.

One session of the meeting was devoted to a symposium on mining education, with the first three speakers representing the coal industry and the last two engineering students just graduated from college. E. R. Price, general superintendent, Inland Steel Co., Wheelwright, Ky., speaking of the opportunities in coal mining, reported that foremen's salaries are higher and the chances of advancement greater than in the other mining industries. The young engineer should be a clear thinker, reliable, tactful and truthful and should set out to learn labor problems at first hand, Mr. Price said. He suggested that sales departments of the large commercial coal companies consider employing mining engineers after they

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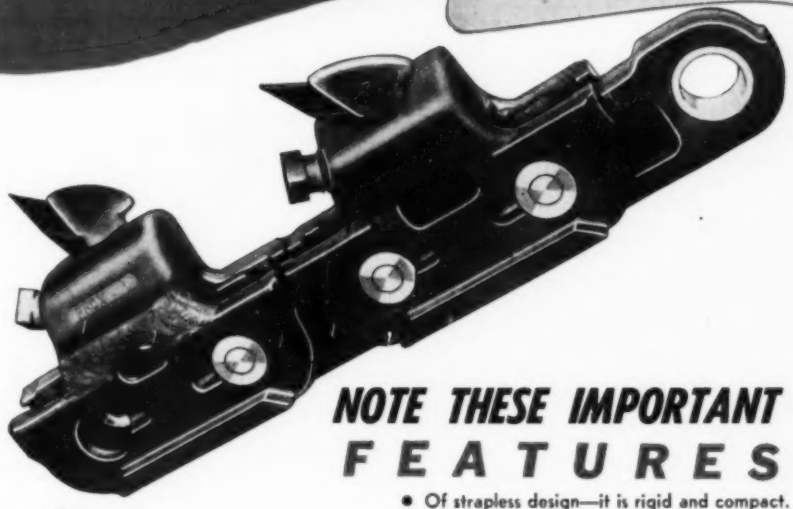
EXTRA LONG SERVICE
ADDED SAFETY
QUICK AND EASY MAINTENANCE



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THIS INSIGNIA to identify Bituminous Coal Research Inc., and its supporting members has been designed and is being made available for use on letterheads, in advertising and elsewhere. The design is available in black and white, as shown above, or in two colors. Purpose of the insignia is to promote wider support for the industry's research program and to show customers that member companies are sponsoring research to provide better product and improved utilization.

gain some mining experience and that the coal companies encourage young engineers to join engineering societies, possibly paying their dues for the first year.

William C. Nelson, management engineer, described the training program of the Island Creek, Pond Creek Pocahontas and Marianna Smokeless coal companies for graduates and undergraduates in mining, electrical and mechanical engineering. A specific schedule of training is prepared so that each foreman knows when to expect the new man in his department and what he should teach him. The schedule also tells the man what he is expected to learn.

The young engineer must make a report every three months outlining what he has learned. If he turns in three bad reports, he is permitted six more months to try to find himself, and if he can't he is then advised to seek other employment. The general training in the various departments takes 15 months. The last nine months of the two-year training period is spent in the specific department in which the man is interested. Where possible, mechanical and electrical engineers receive three months' work at the face. All trainees are encouraged to join the union and to attend all union meetings. Salary is guaranteed during the training period, regardless of mine shutdown from a strike or other cause.

M. D. Cooper, manager of vocational training, National Coal Association, in directing his talk to young engineers, said that responsibility is the qualification of greatest value to the

SAFE, EFFICIENT ROOF CONTROL with SIMPLEX Pin-up Jacks

When temporary support of cross timbers is needed at the working place, you can depend on Simplex Pin-Up Jacks to do the job — with positive safety, and without interfering with work.

The forked base slips securely onto pins set in the rib. It can't slip out, yet there is no interference with loading machines. Head of Jack sets securely against supporting timber.

These Jacks save productive time because they are quickly set into place and are easily adjustable to varying roof heights. Simplex engineering has given them a foolproof mechanism plus rugged construction. With them, you avoid needless dangers of ordinary supports.

Available in 8 and 16 ton capacities — complete with square tubing (1½" or 2½" diam.), or with fittings alone for use with 2" standard or extra heavy round pipe.

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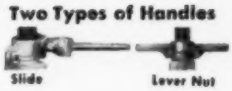

Slide — Lever Nut

SIMPLEX *Ratchet Lowering* MINE JACKS

Use these Safety Speed Ratchet Lowering Jacks — 5 to 35 tons cap. — for all purpose jacking with cutting and loading machines, rerailing mine cars, shop and track work. All models lift full capacity on cap or toe — an exclusive Simplex feature.

86A For Thick Seams — 85A For Medium Seams — 84A For Thin Seams

Simplex LEVER • SCREW • HYDRAULIC Jacks

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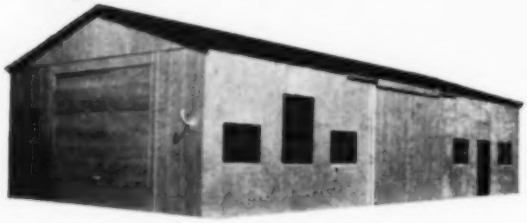
here's a Coal Mine building if you ever saw one



As an experienced mining man you probably have pretty definite ideas on the kind of building you need on mining properties. Let's see how ARMCO STEELOX Buildings meet these requirements.

Here is a sturdy, dependable building that provides all the advantages you would normally expect in any permanent structure. But the unique construction also makes it ideal for use on temporary sites.

ARMCO STEELOX Buildings are easily and quickly moved. They retain structural strength and weather-tightness even when dismantled and re-assembled many times. Obsolescence is never a problem.

You'll also appreciate how easily and quickly STEELOX Buildings can be erected. The STEELOX Section provides both structural support and finished surface. On the roof it replaces rafters, sheathing and roofing. For sidewalls it eliminates framing and exterior covering.

There is a size and type of Standard ARMCO STEELOX Building for practically every mining need. Write for complete information. Armco Drainage & Metal Products, Inc., 2575 Curtis Street, Middletown, Ohio.

STEELOX Timetable

Actual case history shows how one coal mining company moved a Standard ARMCO STEELOX Building (12' x 32' x 8') to a new site using only 5 men and a truck.

7:00-10:30 A.M.—Dismantled building and loaded on truck.
10:30-11:00 A.M.—Driving to new site.
11:00-11:30 A.M.—Lunch.
11:30- 7:00 P.M.—Building completely re-erected and ready for use.

Only a total of 55 man-hours required for complete move.

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ARMCO STEELOX BUILDINGS

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employer. He suggested that a man get as much electrical knowledge as he can along with his mining engineering and pointed out that a knowledge of physics and chemistry is valuable in cleaning-plant work.

William N. Poundstone, a 1949 graduate in mining engineering, West Virginia University, summarized the results of a comprehensive questionnaire answered by senior, junior and some sophomore students at that school, as to what they expected in a mining-engineering career. Highlights of the study indicated that the seniors expect to get $347 per month (average) on their first jobs, 37½% of all students questioned expect to go into surveying first and that this whole group regarded, in the order of importance, chance for advancement, salary, working conditions and security as the first four of the many items they want jobs to offer. Because of the high percentage of older men and the many married men in present classes, the questionnaire might be answered differently by the graduating classes of next year and thereafter, Mr. Poundstone pointed out.

David T. Prichard, 1949 graduate in mining engineering, Virginia Polytechnic Institute, outlined what mining-engineering students from that school expect as reported at student meetings called for that purpose. They seek jobs with companies they like, that have good relations, progressive officials, mine a good grade of coal, where they will be given an opportunity to cut cost and will feel that they are needed. They prefer good living conditions, including recreational facilities, and specifically want good schools. Considerable importance was attached to the thickness of the coal seam and the working conditions as affecting safety, it was reported.

R. W. Laird, instructor, oil and gas engineering, West Virginia University, described the use of the airborne magnetometer, a low-cost method of surveying large areas to locate possible "highs" where oil and gas might be trapped and of estimating the depth of those highs.

In laboratory tests described by Dudley Thompson, assistant professor of chemical engineering, Virginia Polytechnic Institute, settling of phosphate-mining tailings was speeded up by treatment with high-frequency sound waves. Based on a 5% concentration, the result in one hour was equal to normal settling in 22 hours. This experimental work was done in the T.V.A. laboratory at Wilson Dam. A tremendous problem in disposal of tailings in such a manner as to avoid stream pollution exists since the tailings, largely consisting of very fine clay, forms a jell that after a full year of settling contains 75% water. The volume of tailings exceeds the total volume of material mined. Mr. Dudley also described the phosphate mining and washing practices of the T.V.A.

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45% MORE FOOTAGE AT FAR LESS COST!

Here's real savings in labor . . . man hours . . . and drilling costs . . . and 45% more drilling footage by actual tests!

The miner can carry the entire setup—Thor Sinker and Thor Leg—into the smallest tunnel or closest corner, set it up in an instant, start the hole . . . and then let Thor do the work! All he does is control the *constant pressure* feed by operating two simple throttles—*the only automatic controls in leg operation!*

Think of the savings . . . both in operating costs and air consumption. With carbide bits the Thor Leg can replace drifters—and heavy mountings on scores of heavy duty operations . . . can drift in tunnels where drifters won't fit. Write today for catalog data.

FULLY AUTOMATIC—A quick, easy setup—just start the hole—set the leg at any angle between 30 and 45 degrees. .the leg does all the lifting—all the constant pressure feeding . . . control the feed with a turn of the wrist!

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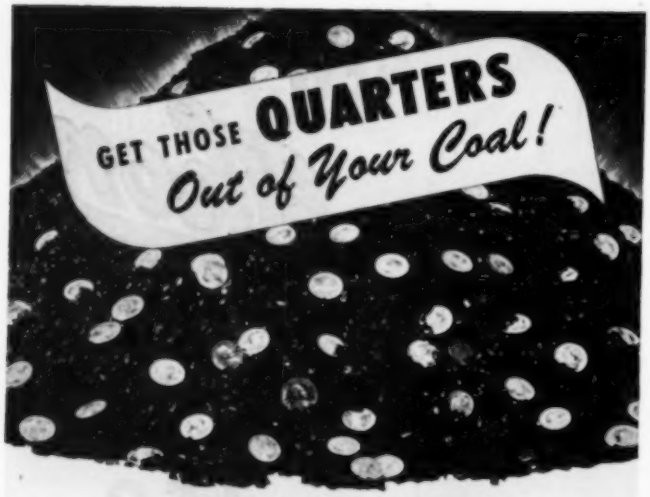

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SAVE UP TO 25¢ PER TON. This is it! The competitive coal market is back. All operations must utilize every possible cost-cutting device. Why not *BEGIN* where you can save most? Timber represents 40% to 60% of your supply bill. We can cut this cost by making mine timber LAST LONGER. You save on timber! You save on replacement! With Osmose you can make any wood species, even beech, gum hickory, ash, elm and maple, into long-lasting timbers.

1 **We can furnish you with OSMOSE TREATED TIMBER**

We can supply you with Osmose-treated square-sawed, slabbed or round timbers, ties, collars, posts, lagging, caps, wedges or tipple timbers from one of our treating plants. These select OSMOSE-treated timbers will render many years of EXTRA service.

2 **We will CUSTOM-TREAT TIMBERS furnished by you**

We will OSMOSE-treat your own timber at our nearest treating plant. Remember, this treatment can be applied to ANY wood species, even beech, gum, hickory, ash, elm and maple.

3 **We will furnish MATERIALS and YOU can treat your own timber**

By constructing an inexpensive vat and following directions, you can treat your own green timber with OSMOSALTS.

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Preparation Facilities

Harry J. O'Brien, Suedberg, Pa.—Contract closed with Wilmot Engineering Co. for Type A jig to prepare nut coal; feed capacity, 15 tph.

Stanley Coal Co., Shamokin, Pa.—Contract closed with Wilmot Engineering Co. for Type D jig to prepare nut coal; feed capacity, 20 tph.

Ashland Hydrotator Co., Ashland, Pa.—Contract closed with Wilmot Engineering Co. for 2½-ft-diameter Wilmot Hydrotator to prepare barley coal; feed capacity, 15 tph.

T. F. Steel Coal Co., Junedale, Pa.—Contract closed with Wilmot Engineering Co. for 9-ft-diameter Wilmot Hydrotator to prepare buckwheat No. 5 coal; feed capacity, 25 tph.

Beaver Brook Coal Co., Beaver Brook, Pa.—Contract closed with Wilmot Engineering Co. for 9-ft-diameter Wilmot Hydrotator to prepare buckwheat No. 5 coal; feed capacity, 25 tph.

Evans Coal Co., Inc., Bokoshe, Okla.—Contract closed with Deister Concentrator Co. for eight SuperDuty Diagonal-Deck No. 7 coal-washing tables to clean 1¼x¼-in stoker coal.

Tennessee Coal, Iron & R. R. Co., Concord plant, Birmingham, Ala.—Contract closed with Deister Concentrator Co. for eight SuperDuty Diagonal-Deck No. 7 coal-washing tables to clean ¼x0-in coal.

Trotter Coal Co., Bunker mine, Cassville, W. Va.—Contract closed with Roberts & Schaefer Co. for R&S Super-Airflow pneumatic coal-cleaner equipment, complete with fans and dust-collecting equipment, capacity, 150 tph, ⅜x0-in slack; plus similar equipment for cleaning 60 tph of ⅜x1¼-in stoker.

Trotter Coal Co., Louise mine, Osage, W. Va.—Contract closed with Roberts & Schaefer Co. for R&S Super-Airflow pneumatic coal-cleaner equipment, complete with fans and dust-collecting equipment; capacity, 50 tph, ⅜x0-in slack.

Island Creek Coal Co., Mine No. 7, Holden, W. Va.—Contract closed with Roberts & Schaefer Co. for R&S Super-Airflow pneumatic coal-cleaner equipment; capacity, 90 tph, ¼x0-in coal.

Island Creek Coal Co., Mine No. 27, Scarlet, W. Va.—Contract closed with Roberts & Schaefer Co. for complete preparation plant for cleaning 75 tph of ¼x0-in coal; to include R&S Hydrotator Process Units complete with all equipment, C.M.I. dryers for preliminary drying of ⅜x0, and Raymond Flash Dryer for drying ¼x0.

D.J.B. Collieries, Inc., Flanary, Ky.—Contract closed with Roberts &

COAL-HEAVER WANTED
Husky, reliable worker for hard job in open-pit mine. Must be able to put in long hours without time-wasting delays. High efficiency, low operating costs important. Steady job for right party.
Box 100-B

This Applicant GETS THE JOB!

Because it has the strength, capacity and durability for sustained high production, this Bucyrus-Erie 100-B shovel with 7-yd. coal-loading dipper turns in outstanding performance records in helping to meet the steadily increasing demands for coal from open-pit mines. It's fast, because there's no useless deadweight to swing . . . because precise Ward-Leonard electrical control gives the operator the quick, smooth response he needs to make every minute of every shift count. It stays on the job because it's strongly built of long-wearing steels and alloys, and designed from top to bottom for long years of profitable service in the toughest jobs, with low operating and maintenance costs. Like all Bucyrus-Eries, the 100-B represents nearly 70 years of continued leadership and progress in the construction of quality machines for the excavating industry.

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● Amsco Nickel-Manganese filler bars and electrodes built up this dipper used in the rugged service of a northern iron ore mine. For buildup and repair work on manganese steel, Amsco Nickel-Manganese will provide a long wearing surface to resist heavy impact and abrasion. Nickel-Manganese electrodes are cold drawn rods, provided either coated for D.C. and A.C. or bare for D.C. welding. Weld deposits surface harden to 450-550 Brinell under cold working and have a toughness and ductility which approaches that of standard 13% manganese steel. Drilling sheaves, spindles, crossings, wobblers, crushers, and hammer mills are other applications where Nickel-Manganese has proved its value. Amsco cast and rolled repointer bars, plates, and hardfacing rods are also available. Write for Bulletin 10-A and W-1 for sizes and types of bars.

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Schaefer Co. for complete tipple equipment, including R&S Hydro-separator, shaker and vibrating screens and washed-coal and refuse conveyors; capacity 200 tph, run-of-mine.

Lion Coal Co., Ogden, Utah—Contract closed with Roberts & Schaefer Co. for R&S Super-Airflow pneumatic coal-cleaning equipment, complete with fans, dust-collecting equipment, piping, elevating and conveying machinery; capacity, 70 tph, 1⅝x⅝-in coal.

Central Appalachian Coal Co., Morris Creek mine, Montgomery, W. Va.—Contract closed with Roberts & Schaefer Co. for complete tipple and Baumjig coal-washing plant; 5x¼-in coal to be washed and ¼x0 bypassed; capacity, 350 tph.

Vera Pocahontas Coal Co., Mine No. 3, Landgraff, W. Va.—Contract closed with Fairmont Machinery Co. for 5x14-ft American Twin-Dex pneumatic separator to treat ⅜x0-in coal; capacity, 50 tph.

Jacob's Fork Pocahontas Coal Co., Berwind, W. Va.—Contract closed with Fairmont Machinery Co. for 5x14-ft American Twin-Dex pneumatic separator to treat ⅜x0-in coal; capacity, 50 tph.

●

Coal Publications

Papers Presented at the Seventh Short Course in Coal Utilization. Engineering Experiment Station, Circular Series No. 53. University of Illinois, Urbana, Ill. 192 pp. 6x9-in; paper. $1. Twenty papers read Sept 17-19, 1946, on storage, deliveries, sales and advertising, home design, smoke prevention, coal preparation and other subjects.

Analysis of Coal Cleaning on a Concentrating Table, by C. C. Boley. Illinois State Geological Survey, Urbana, Ill. Report of Investigations No. 136. 63 pp. 6¾x10-in; paper. Data indicating, among other things, that (1) increased wash water and water-to-coal ratio lead to improved results under conditions of constant weight yield, (2) increased longitudinal slope and decreased speed of reciprocation promote a cleaner product, and (3) rate of feed, transverse slope, table stroke, table movement and composite slope have little effect on results independent of weight yield.

Accidents from Hoisting and Haulage in Bituminous-Coal Mines; Section 3, Coal-Mine Accident Prevention Course. U. S. Bureau of Mines, M.C. 49. 59 pp. 6x9 in; paper. 20c, Supt. of Documents, Government Printing Office, Washington 25, D. C. About one-fifth of all accidents in bituminous mines are due to haulage, the

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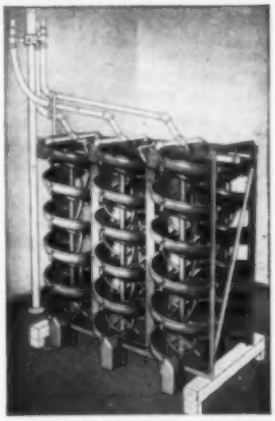

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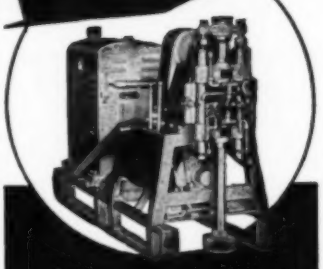

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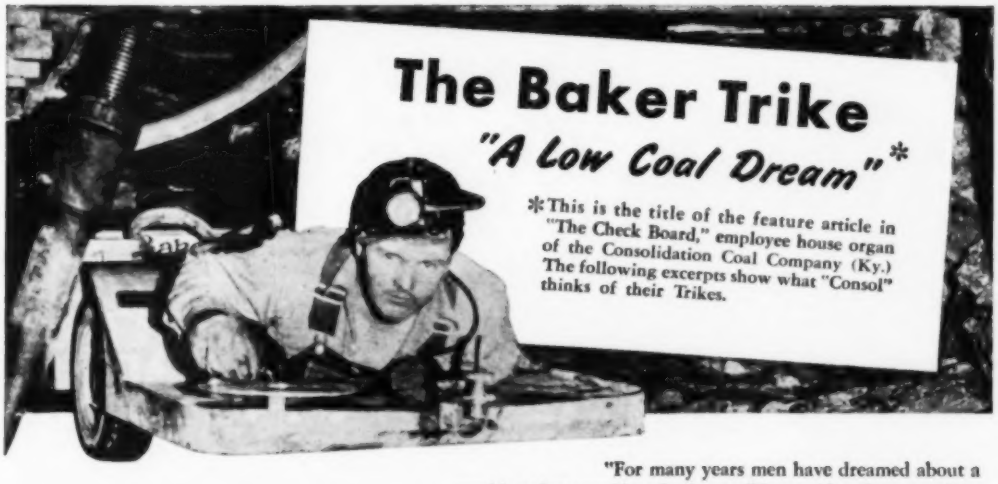


The Baker Trike

*"A Low Coal Dream"**

*This is the title of the feature article in "The Check Board," employee house organ of the Consolidation Coal Company (Ky.) The following excerpts show what "Consol" thinks of their Trikes.

"For many years men have dreamed about a machine that would make it possible to ride when traveling in low coal. Such a machine was especially needed for officials, engineers, mechanics, and others whose work required them to travel great distances in low coal, sometimes with light equipment, instruments, repair parts and tools. Walking when bent over or crawling on knees makes it easily understood why the 'Trike' is the answer to their dreams."

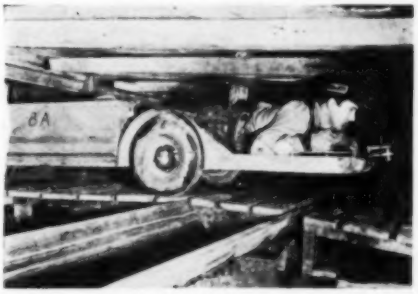
"... a good, swift means for a person to travel anywhere, even when the overhead clearance might be as low as twenty-two inches and the distance between props only three feet ... capable of going through mud, over rough ground, and turning around in almost its own length."

"Since the Trike is only 22 inches high it is possible to travel under the pan line next to the shaker conveyor drive, or over the pan line by means of a small ramp and a filler block."

Although the Trike was not designed for it, Consol installed a hitch so that a trailer could be attached. The article states, "Today, all the cross-bars, props, cap pieces, rock dust, pans, cradles, belt extension parts, as well as the oil and grease, are delivered from the outside to the face by the Trikes and Trailers. Once when it was necessary to bring an injured man out, the stretcher was placed in the trailer. It seems that every day a new use or an added advantage comes to light which is responsible for the enthusiasm of the men for this new machine."

We thank the Consolidation Coal Company (Ky.) for proving to us that the Trike is even better than we thought.

Fourteen-foot cross-bars on trailers are hauled by the Trike to the working places.



Conveyor is stopped momentarily to insert filler block and allow Trike to cross to the other side.

Write for complete information on Baker Trike, Mine Tractor, Timbering Machine and Fletcher Trailers.

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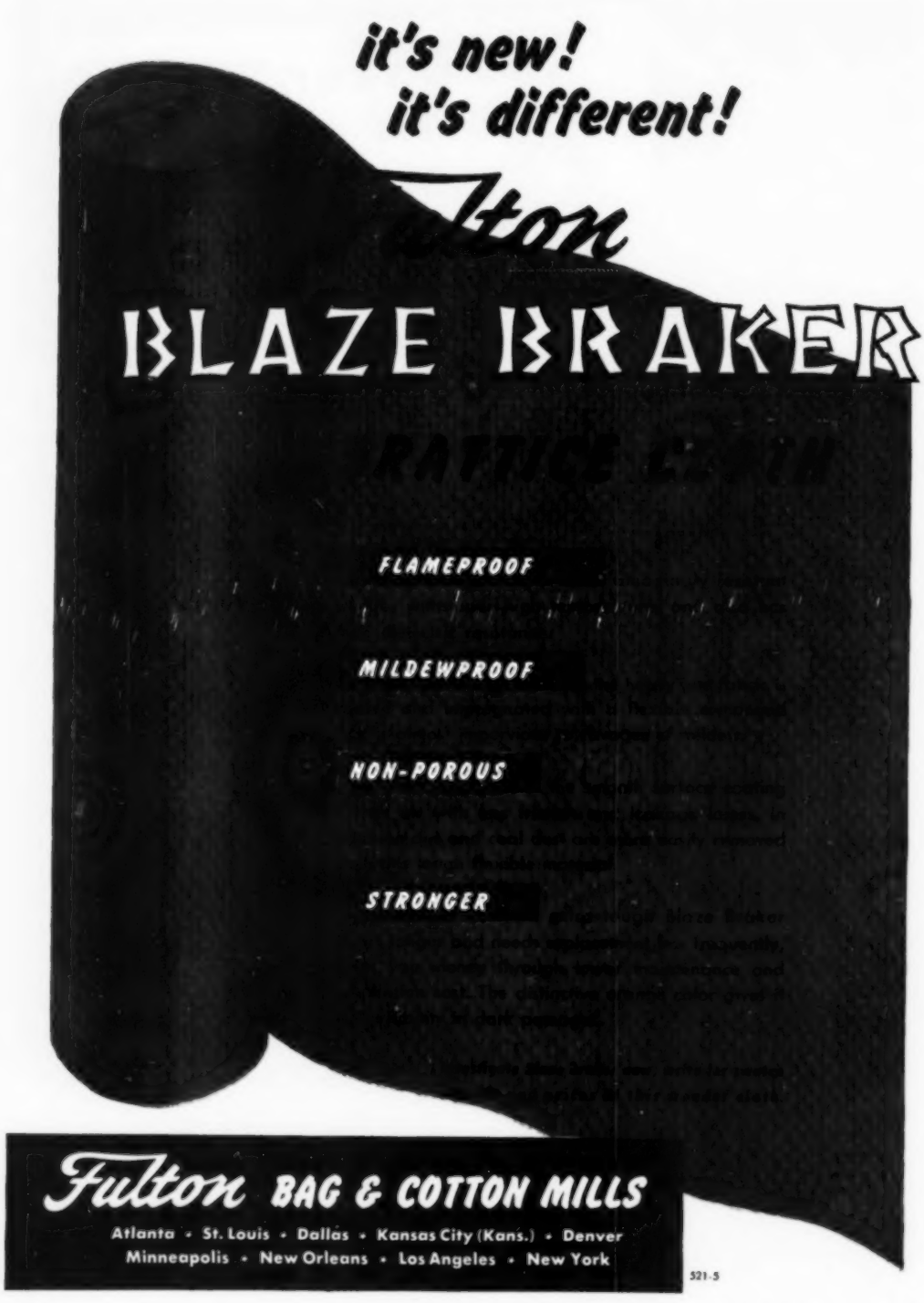
Baker MINE EQUIPMENT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largest number occurring by striking, running over or squeezing the worker. Recommendations include control of haulage by haulage crews, elimination of unsafe practices, improved road maintenance and enforcement of company rules and safety laws.

Reserves, Petrographic and Chemical Characteristics, and Carbonizing Properties of Coal Occurring South of Dry Fork of Minnesota Creek, Gunnison County, Near Paonia, Colo., and the Geology of the Area, by A. L. Toenges, J. J. Dowd, L. A. Turnbull, J. D. Davis, H. L. Smith and V. A. Johnson. U. S. Bureau of Mines, T. P. 721. 30c, Supt. of Documents, Government Printing Office, Washington 25, D. C. About 625,000,000 tons should be recovered from the five beds studied but only coal from the lowest bed studied will yield a well-fused coke, somewhat inferior to that produced from coal of the Lower Sunnyside bed in Utah.

Fire-Fighting Facilities at Four Pennsylvania Bituminous-Coal Mines, by G. W. Grove and O. V. Simpson. U. S. Bureau of Mines, I.C. 7498. 17 pp. plus 22 pp. of illustrations. 8½x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. No large or fairly large mine can be considered safe without ample water supply, water lines with outlets at frequent intervals, and hose and nozzles. The four mines described indicate what can be done at other mines to improve fire-fighting facilities.

Carbonizing Properties of No. 5 Block-Bed Coal from No. 5 Mine, Raleigh County, W. Va., and of Pocahontas No. 6—Bed Coal from Birdseye Mine, Sewell, Fayette County, W. Va., by J. D. Davis, D. A. Reynolds, D. E. Wolfson, W. H. Ode and R. E. Brewer. U. S. Bureau of Mines, T. P. 711. 20c, Supt. of Documents, Government Printing Office, Washington 25, D. C. Analyses of mine samples and blends and charts of their yields of coke, gas, tar and light oil. One of a series of Bureau reports in connection with a current survey of mineable coking coals.

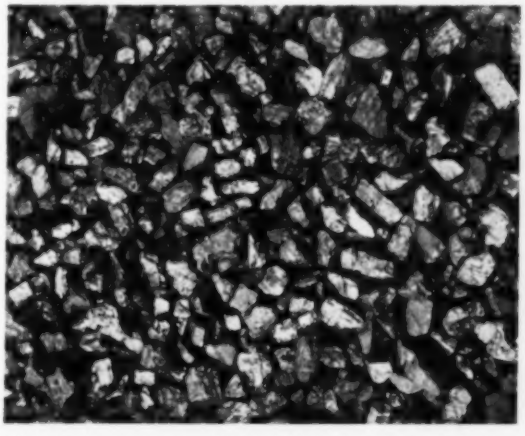
Coal-Mining Methods and Practices in Western Arkansas: Preliminary Investigation, by A. L. Toenges and E. L. Fish. U. S. Bureau of Mines, R.I. 4448. 25 pp. plus 7 pp. of illustrations. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. Preliminary studies show high timber and ventilation costs and indicate that changes in prevailing mining systems might provide greater efficiency.

Power Capacitors, by R. E. Marbury. McGraw-Hill Book Co., 330 W. 42d St., New York 18. 205 pp. $3.50. Use of capacitors on power circuits; how to determine the kind and number of capacitors to correct voltage or low power factor of a combination of both. The first volume in a forthcoming uniform series, "Westinghouse-

Clean Coal at low cost calls for SECO VIBRATING SCREENS

Photo Taken at Hockersmith Coal Co., Manchester, Ky.

Today—the big market is for clean, properly-sized coal. That's why more and more operators are turning to dependable Seco vibrating screens—for all their cleaning and sizing requirements. Smooth operating Seco vibrating screens are built to take it. Built to give maximum tonnages month after month; year after year—with little or no maintenance. It all adds up to clean coal—at lowest cost—and greater profits for you.



Make the sizes your customers are calling for! Seco vibrating screens in single, double or triple deck models may be equipped with wire cloth or perforated plate to give you any size or sizes of coal you desire.

Let Seco screening experts help you get clean, properly-sized coal — at low cost. Write Dept. CA-7 for Coal Bulletin #11.

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SCREEN EQUIPMENT CO., INC.

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In Canada, United Steel Corp. Ltd., Toronto, Ont.

When good eye protection . . .

is no good at all!

This is a common sight in many plants—a condition that contributes to top-heavy accident rates, compensation costs and to lags in production.

Cover-All* Goggle Style CC60

Wearing comfort, more than anything else, will move safety goggles off the forehead on to the eyes. In Cover-All* goggles, as in all WILLSON protective equipment, comfort plays a big part in their design. The large, deep eyecups allow plenty of room for wearing prescription spectacles—and they are molded with rolled edges to fit facial contours around the eyes. The soft, leather bridge adjusts to the correct distance between the eyes and the adjustable headband provides for proper head size.

Don't fail to consider personal comfort if you want eye safety equipment worn as intended.

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Such as Willson "Blind Man" safety posters keep workers in hundreds of plants aware of the need for personal safety measures. Supplies are available on request

WILLSON PRODUCTS, INC., 239 WASHINGTON STREET, READING, PA.

McGraw-Hill Engineering Books for Industry."

Heating, Ventilating and Air Conditioning Guide (1949 edition). American Society of Heating and Ventilating Engineers, 51 Madison Ave., New York 10. Technical data, 992 pp; manufacturers' catalog, 392 pp. $7.50. Fifty-two chapters on human reaction to atmospheric environment, heating and cooling loads, combustion and consumption of fuels, heating systems and equipment, air conditioning, special applications and installation and testing codes.

Investigation of Coal Deposits in the Fairview and Coal City Basins, Coosa Field, St. Clair County, Ala., by A. L. Toenges, L. A. Turnbull, T. R. Jolley, J. J. Shields, H. L. Smith, H. J. O'Donnell, H. M. Cooper, R. F. Abernethy, B. W. Gandrud, H. L. Riley and H. W. Rothrock. U. S. Bureau of Mines, T. P. 719. 104 pp. 5⅞x9¼-in; paper. 50c, Supt. of Documents, Government Printing Office, Washington 25, D. C. Coal from the Coosa field, classified as high-volatile A bituminous, if used for railroad, industrial and domestic purposes, could relieve the drain on coking coal reserves in the nearby Warrior field. If jigs and wet tables are used for cleaning, 4x0-in washed coal from the Fairview bed in the Coosa field contains about 10.1% ash and 2.47% sulfur.

Safeguarding Underground Workmen From Noxious Gases Resulting From Blasting in Strip Mines, by A. H. McCleary, M. W. Price and J. V. Mather. U. S. Bureau of Mines, I. C. 7503. 8 pp plus 13 pp of illustrations. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. Procedures used by the Jeddo-Highland Coal Co., Jeddo, Pa., to protect underground personnel from asphyxiation by carbon monoxide or other toxic gases resulting from blasting in adjacent strip mines.

Investigation of Coal Deposits in South Central Alaska and the Kenai Peninsula, by A. L. Toenges and T. R. Jolley. U. S. Bureau of Mines, R.I. 4520. 37 pp plus 6 pp of illustrations. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. Results of a preliminary survey of coal reserves as a source of fuel for homesteaders and planned industrial development.

Supplement to Lincoln's Industrial-Commercial Electrical Reference Book, 1949, by E. S. Lincoln. The Electrical Modernization Bureau, 41 East 42d St., New York 17, N. Y. 113 pp. 8½x11-in; paper. Free to owners of the basic book if serial number is submitted. Contains complete changes in the National Electrical Code from 1940 to 1947. Sections on industrial wiring systems, controls, circuit protection, power factor, industrial lighting and storage batteries.

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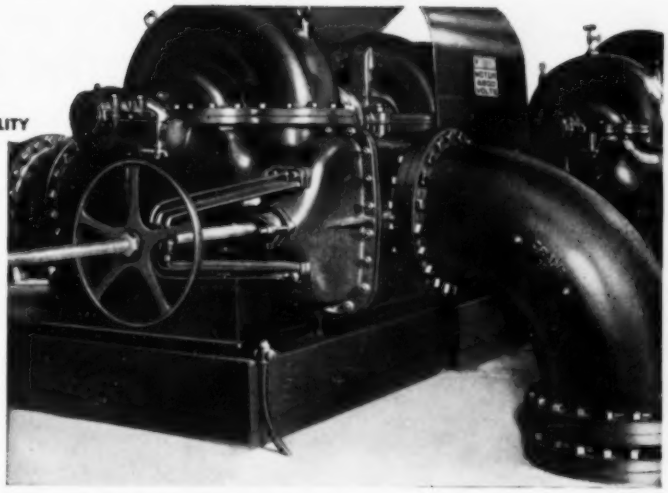

POWER HOUSE *at a copper mine. Crane iron body gate valve, shown here, controls flow of condenser water. Piping for the entire installation can be specified from the Crane line.*

When it's piping for mines . . . it's CRANE for complete selection

On any mine piping job . . . above ground or below . . . the surest way to get the exact piping equipment you need is to "get it from Crane." For there is no more complete assortment of valves, fittings, pipe and accessories than that contained in the Crane Catalog. One order through Crane Branches, strategically located for your convenience, covers everything—in brass, iron, steel and corrosion-resistant alloys.

Because of the unmatched completeness of this **Single Source of Supply,** many mines have long standardized on Crane to simplify every step of piping procedures. Putting **Complete Responsibility** for materials on one source helps to get better installations, without needless delays on the job. And for **High Quality** in every piping item, get Crane Quality—unsurpassed for more than 90 years.

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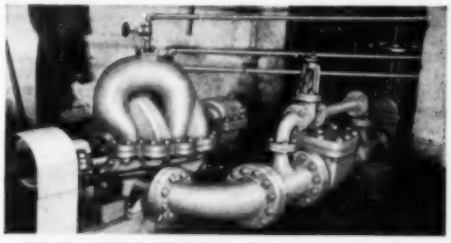

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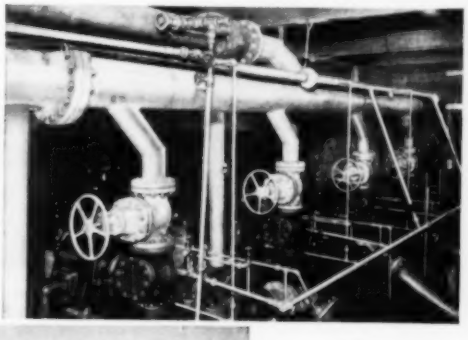

PUMP ROOM IN LEAD MINE *featuring Crane 250-pound Ferrosteel wedge gate and swing check valves in outlet lines.*

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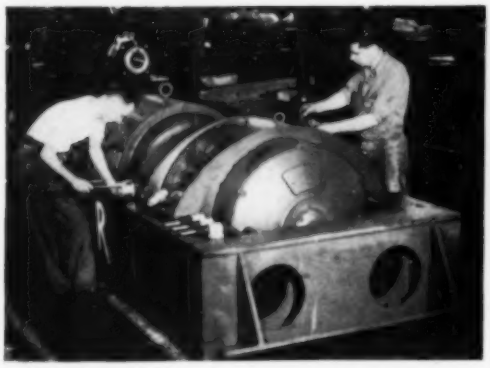
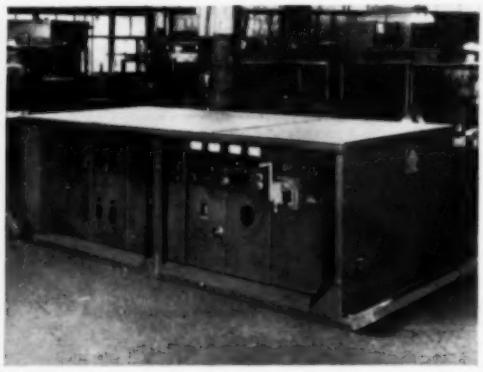
FOR EVERY PIPING SYSTEM

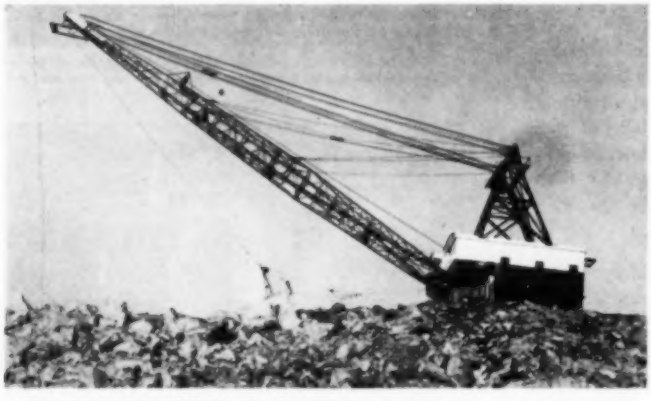
Equipment News

More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer





MOTOR-GENERATOR SET—New 300-kw portable mg set, described as expressly designed to meet new dc-power requirements in mining with continuous-type mining machines, is said to feature unusual compactness of design and relative light weight. Under 43 in high, 7 ft wide and 16 ft long, the unit weighs approximately 19,000 lb. Driven by a 2,300-volt 450-hp synchronous motor, the mg set is capable of handling a 25% overload for two hours and 100% overload for one minute and, through its sectionalized dc distribution panel, will serve two continuous mining machines and associated auxiliaries, the company says. Both the mg set (left) and its control-and-switchgear assembly (right) are mounted on specially designed rigid skid bases in two self-contained "packages" to facilitate moving. Excitation for the synchronous driving motor, which is specially designed for full-voltage starting with low kva, is taken from the generator circuit and the dc generator is compound-wound, interpole-design, self-excited.—*Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio.*

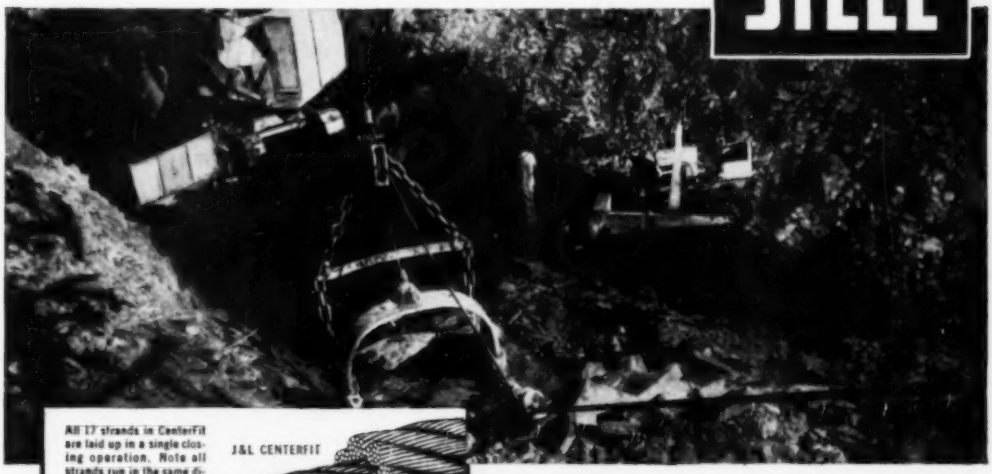


WALKING DRAGLINE—New 500-W electric walking dragline offers bucket capacities ranging from 8 to 12 cu yd and booms from 165 to 205 ft. Features include individual drag and hoist motors and twin drag lines. Working weight is 1,275,000 lb and, with the 205-ft boom, maximum dumping height is 107 ft, digging depth is 135 ft and material can be moved 416 ft horizontally without throwing the bucket, the company reports. The circular working base covers 804 sq ft and the unit walks with 7-ft 4-in steps on shoes 37 ft long and 6 ft wide. Generator units are laterally placed in the rear of the house so that digging vibrations are normal to the bearings, it is said, and swing is accelerated and decelerated under Ward-Leonard variable voltage control.—*Bucyrus-Erie Co., South Milwaukee, Wis.*

CIRCUIT BREAKERS—New line of Type DB 600-volt-dc or 250-volt-ac circuit breakers with extremely accurate tripping characteristics for low-voltage power distribution, motor-starting duty, etc., has been announced by Westinghouse Electric Corp., Pittsburgh 30, Pa. Accurate control for long time delay with protection from tampering reportedly is provided by a time-delay element assembled in an

GILLESPIE COAL COMPANY gets 30% Longer Service with J&L CenterFit Wire Rope

J&L STEEL



All 17 strands in CenterFit are laid up in a single closing operation. Note all strands run in the same direction. Outside strands fit snugly into valleys between inside strands and eliminate crossing of strands as in conventional design. This prevents internal nicking—gives longer wear. Eight outside strands (CenterFit design) give more steel, less void space, greater flexibility, easier handling.

J&L CenterFit drag cable as seen from the fairlead sheave of a Marion 40-A dragline. The 3-yd. bucket is removing overburden from coal seam.

The "right wire rope for the job" pays off in longer service, reduced maintenance and greater profits.

A 30% average increase in service life! That's the performance record reported by Gillespie Coal Company when J&L CenterFit wire rope replaced a conventional dragline cable on a Marion 40-A dragline equipped with a 3-yd. bucket at its Lyons, Ind., open pit coal mine.

Average life of a conventional 6x19 dragline was 12 to 15 days; with CenterFit it was 17 to 22 days!

J&L CenterFit wire rope was selected for this application as a result of a careful analysis of operating conditions at the Lyons mine by Mr. L. S. Shaffer, J&L wire rope distributor in Brazil, Indiana. He knew the CenterFit design—exclusive with J&L—would provide the greater flexibility required for long service life on the small diameter sheaves and drums of this dragline. Actual performance records *proved* that CenterFit was *the right rope for this particular job.*

Perhaps you, too, can use J&L CenterFit wire rope to advantage. In many places it gives improved performance and longer service.

We have just issued a new handbook, "*Wire Rope Is a Machine.*" This 96-page illustrated, pocket-size book is written *for the man on the job.* Tells how to select the correct wire rope . . . How to install, operate and maintain wire rope for maximum service. If you use wire rope, we'll gladly send you a copy. The coupon is for your convenience.

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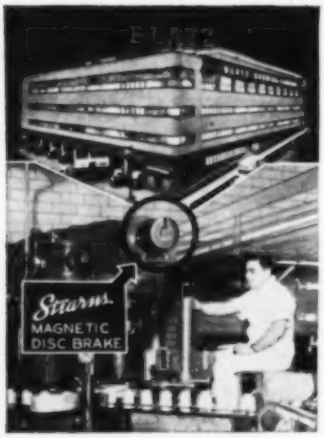
PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS



Watchdog

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Canning 328,000 cans of beer per day requires a smooth, even operation at the Blatz Brewery in Milwaukee. *Stearns Magnetic Disc Brakes* are an integral part of their modern equipment to quickly stop the process in case of jamming and miscapping.

This is only one of many applications efficiently and economically solved with *Stearns Magnetic Brakes*. Reduce your production costs by eliminating expensive time lost in coasting motors and machinery. Available in all sizes and types to fit your needs.

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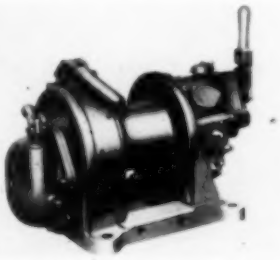
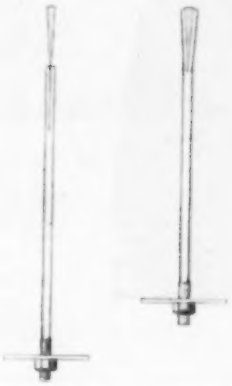
hermetically sealed tube. Breakers are available for overcurrent protection with delayed and instantaneous tripping, or for overcurrent protection with both long and short delay. Two frame sizes are available: DB-15, with an interrupting rating of 15,000 amp with load-current ratings up to 225 amp at 600 volts ac or 250 volts dc; and DB-25, rated for load currents up to 600 amp with an interrupting capacity of 25,000 amp.



AIR HOIST—New Size BU midget single-drum utility hoist for a variety of hoisting, skidding and hauling jobs reportedly will lift a 600-lb load at 50 fpm and can handle heavier loads with proper sheave blocks. The reversible four-cylinder-radial piston-type air motor is equipped with safety-type throttle. A wide band-type brake gives positive holding power, the company says. For quickly pulling out cable, a convenient clutch lever permits the operator to readily disengage the drum. The unit measures only 18½ in long, 10¾ in wide and 11¾ in high and weighs only 72 lb less rope.—*Ingersoll-Rand Co., 11 Broadway, New York 4.*

CRANE MOUNTING — Keystone Driller Krane Karriage recently announced is a one-man self-propelling mounting for all makes of cranes from 10- to 25-ton capacity equipment includes a four-speed transmission for 2 to 10 mph in either direction. Complete control of the entire machine from the operator's seat in the cab, short turning radius, air-operated brakes on all wheels and

hydraulic steering are features cited for the unit.—*Equipment Div., Keystone Driller Co., 419 Wood Street, Pittsburgh 22, Pa.*



MINE-ROOF-SUPPORT BOLTS—Popularly called the "Skyhook," two types of mine-roof-support bolts functioning similarly to an expansion anchor bolt have been announced. The slot-and-wedge type illustrated consists of a variable length 0.912 or 1-in-diameter shaft, with 1-in-diameter rolled or cut thread about 4 in

MORE HAULAGE FOR 20% LESS BATTERY CAPACITY

Oil-right, non-leak transmission. Use regular auto oil; change every 6 months.

Extra-long journal springs assure better trackability.
Large motor, to assure more horsepower per ton weight of locomotive.
Can be equipped with hydraulic brake.

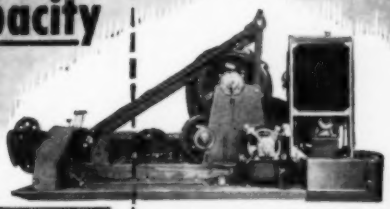
GREENSBURG "RANGER"

This locomotive being used for main line haulage at the Blacksmith Coal Company, Novinger, Missouri. This is a 4½ ton locomotive, operating on 30" gauge track. This locomotive built from 3½ to 10 tons — either single or double motor-drive — 16" to 56½" track gauge.

All Greensburg Locomotives are **CUSTOM-BUILT** *to your requirements*

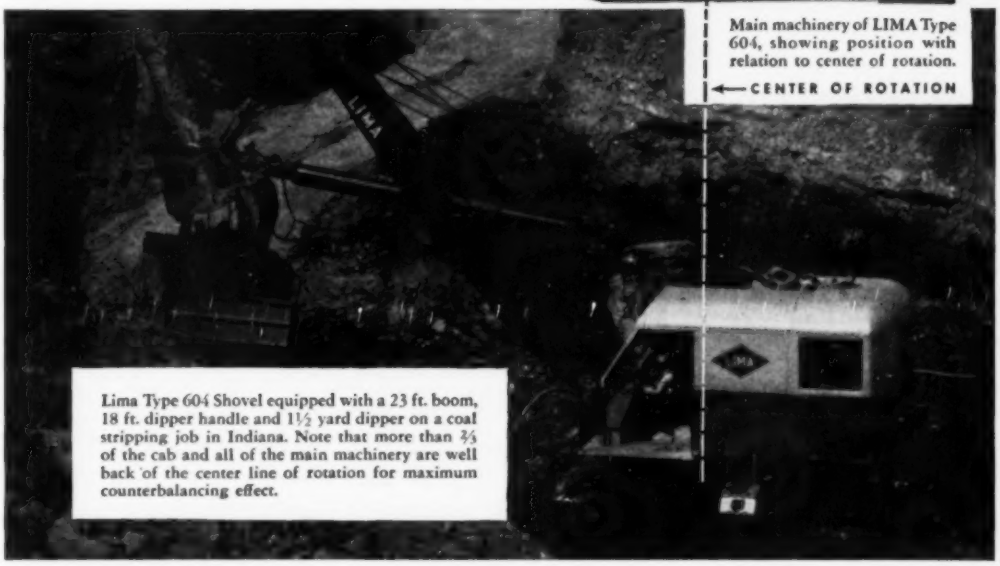
THE GREENSBURG MACHINE CO. 101 STANTON ST. **GREENSBURG, PA.**

Why the LIMA Type 604 develops the greatest capacity per lb. of weight



Main machinery of LIMA Type 604, showing position with relation to center of rotation.

←CENTER OF ROTATION



Lima Type 604 Shovel equipped with a 23 ft. boom, 18 ft. dipper handle and 1½ yard dipper on a coal stripping job in Indiana. Note that more than ¾ of the cab and all of the main machinery are well back of the center line of rotation for maximum counterbalancing effect.

● The LIMA Type 604 shovel, crane and dragline is engineered to produce greatest capacity with minimum weight. This is achieved by placing as much weight as possible *behind* the center of rotation—eliminating the need for excessive counterweight. Hook rollers on which the machinery base revolves eliminate strain from the center pintle—permitting continuous, safe operation at full capacity.

The simple, compact design of the main machinery, using the fewest number of shafts to accomplish the various operations, further contributes to efficient, trouble-free service.

These are only a few of the features which make the LIMA 604 a favorite with owners and operators. The Lima Line includes shovels ¾ to 6 yards, Cranes 13 to 110 tons and Draglines variable.

It will pay you to consult your nearest Lima Sales Office or representative before you buy your next shovel, crane or dragline. Offices in principal U.S. cities.

Lima Shovel and Crane Division

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LIMA HAMILTON CORPORATION

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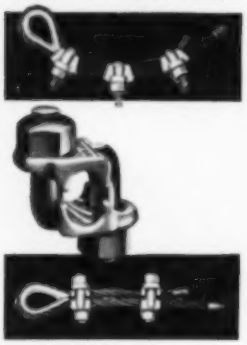

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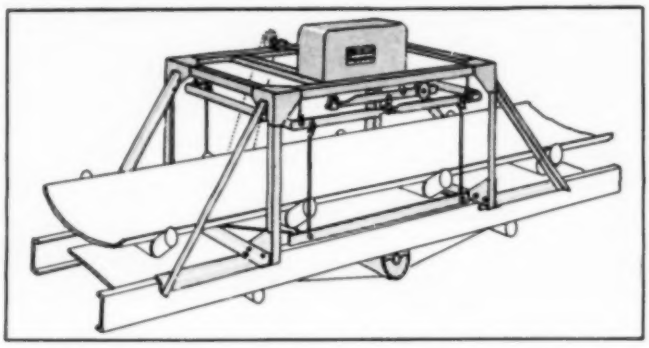
THE MOST COMPLETE LINE OF DROP FORGED WIRE ROPE AND CHAIN FITTINGS

MINE LOCOMOTIVE—New 30-ton 250-volt 480-hp high-speed four-axle main-line haulage locomotive is stated to be especially designed for haulage where the distance from the gathering point to the tipple is 5 miles or more. Its 35-mph maximum permissible speed reduces the time required to return cars to the working places. The new unit is equipped with straight air brakes, a 15-cfm motor-driven geared air compressor, edgewise-wound resistors, sealed-beam headlights and a cam-operated-type master controller. Welded-steel-plate construction produces a rigid structure free from bolts and rivet heads, and high rounded-end frames provide maximum protection for the operator, according to the company. Four traction motors provide a total of 480 hp at their 1-hr rating (blown). The new unit has a rated drawbar pull of 15,000 lb with a speed at this rating of 10.5 mph, and a maximum drawbar pull of 18,000 lb. Bulletin GEA 4774A is available.—*General Electric Co., Schenectady 5, N. Y.*



CONVEYOR SCALE—New unit-type Transportometer belt-conveyor scale, shipped as a complete unit and requiring fewer than a dozen bolts for its complete installation, can be installed on any existing horizontal, inclined or declined belt conveyor of any width or speed, to automatically and continuously weigh, indicate and totalize the tonnage at any rate up to 2,000 tph, according to the manufacturer. The units are available for automatically regulating preceding feeder conveyors, rotary valves, etc., and can be provided with remote-mounted chart recorders, tonnage indicators, duplicate totalizers and predetermined-batch counters.—*Sintering Machinery Corp, 70 Pine St., New York 5.*

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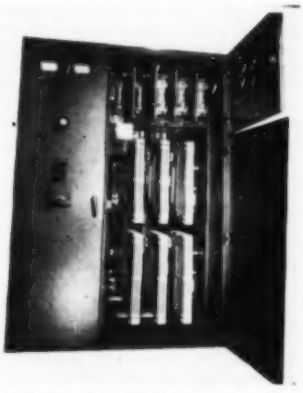
long on the bottom and a longitudinal slot ⅛ in wide extending downward about 6 in from the tip. The steel wedge, 5½ or 6 in long, tapers from ¼ in to ⅝ in and either square or hexagonal nuts are furnished for the threaded end. As the bolt reaches the top of the hole drilled in the roof, the wedge is forced downward into the slot and causes the shaft diameter to expand rapidly and create a solid anchorage.

Second type available is similar except that it has approximately 5 in of thread at the top of the bolt and either a square or hexagon head at the bottom. To install it, a nut is run to the bottom of the thread at the top of the bolt and a soft metal sleeve started over the remaining thread is forced up into the drilled hole in the roof, expanding to form an anchorage. All dimensions are tentative as a standard and can be varied to suit individual users' requirements.—*Oliver Iron & Steel Corp., Pittsburgh 3.*

CONVEYOR BELTING—New addition to Coal-Flo line uses a 4-ply rayon-carcass structure, thinner and lighter than conventional fabrics, and resulting in a highly flexible belt particularly adaptable to crowded underground operations, according to the company. The rayon's greater strength also is said to permit use of belt systems with longer centers, pulley to pulley, reducing the number of transfer points and drives required. The rayon belt, available in standard 26- and 30-in widths, incorporates two principal features of other Goodyear belting: mildew resistance and acid neutralization.—*Goodyear Tire & Rubber Co., Akron, Ohio.*



MOTOR CONTROLLERS—A high-voltage combination-fuse-type air-break motor controller has been developed for complete motor and starter protection, according to the Westinghouse Electric Corp., Pittsburgh 30, Pa. The unit may be used directly without further external protection on 3-phase 50- to 60-cycle circuits capable of producing 150,000 kva at 2,300 volts or 250,000-kva at 4,160 volts. It can be applied with unity-power-factor synchronous motors, 80%-power-factor-synchronous and squirrel-cage-induction motors of various ratings. Basically, the controller consists of a main 3-pole magnetically operated contactor or contactors of the new AH type, with a thermal overload relay to provide normal starting functions, and Type BAL current-limiting fuses to protect the motor and starter against fault conditions exceeding the interrupting capacity of the contactor.

MOBILE CRANE—New all-purpose Handi-Crane, announced by Clyde Iron Works, Inc., Duluth, Minn., has a lifting capacity of 4 tons, revolves 360 deg and features easy steering and small compact size. Mounted on a Model UTI Minneapolis-Moline tractor, the Clyde Handi-Crane reportedly can pick up a load and carry it wherever a tractor can go. Bulletin MP-40 is available from Clyde.

Equipment Shorts

NEW MINE SPRINKLER HOSE colored a bright yellow to improve safety underground has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. Manufactured in ¾-in size only, the hose is constructed with high-tensile rayon yarns covered with tough abrasive-resistant rubber stock. Its brightness is expected to help miners find sprinkler valves easily and to prevent it from being run over.

TURBINE PUMPS—A new line of medium-duty turbine pumps, avail-

ADD YEARS TO CABLE LIFE

Cut Maintenance Costs with RUBEROID INSULATING TAPE...

1. **Double grip; both sides adhesive.**
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3. **Won't tear, ravel or pucker.**
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Where Electric Power—generated at the mine—is needed—Ready-Power Standardized Engine Generators are available for early delivery. Built for this service from standardized designs developed after years of experience, Ready-Power will give you—QUICKLY—Dependable, Low Cost, Electric Power.

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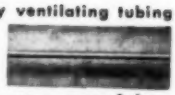

Directs fresh air where you need it

The new improved Flexipipe is efficient, serviceable and economical. It's made in a variety of diameters and lengths and with various accessories to take care of your individual requirements. Write us for complete information and sample.

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able in many types for use in water-supply, condensate-return and boiler-feed service or other applications where non-viscous and non-abrasive liquids are handled against moderate pressures, has been announced by Roy E. Roth Co., Rock Island, Ill. Capacities are 2 to 10 g.p.m. and 20 to 100 head ft. in water at 1,750 r.p.m., or 2 to 8 g.p.m. and 100 to 200 head ft. in water at 3,450 r.p.m.

RADIOTELEPHONE — Low-cost mobile FT-145-10 radiotelephone unit said to offer outstanding reliability under adverse weather and terrain conditions through use of improved circuits and components; power output is 10 watts at any frequency in the 152-to-162-megacycle band; draws only 7.3 amp standby and 23.9 amp transmitting, thus permitting the use of existing batteries and generators in many cases.—*Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N. J*

TRUCK TIRE—Rock Lug Logger, a new off-the-road self-cleaning truck tire, features heavy chip-proof S-curved lugs for maximum traction. —*Pennsylvania Rubber Co., Jeannette, Pa.*

PAVING BREAKER—Intended for fast demolition work and where footing is treacherous, B37 paving breaker weighs only 38 lb but reportedly has the sturdiness and features of many of the company's heavier units. —*Gardner-Denver Co., Quincy, Ill.*

•

Industrial Notes

Joy Mfg. Co., Pittsburgh, Pa., has acquired the Mines Equipment Co., St. Louis, Mo., in an exchange of approximately 28,000 shares of Joy stock for all the Mines Equipment capital stock. In making the announcement, J. D. A. Morrow, Joy president, pointed out that for some years Joy had been the exclusive sales agents for Mines Equipment in the mining and oil-production fields and had accounted for more than half of the firm's volume. With the acquisition of the company, Joy will begin to aggressively push sales of its power distribution systems and electrical connectors in general industry, rail transportation and aviation fields as well, he said.

Koppers Co., Inc., Pittsburgh, Pa., has announced the retirement of J. P. Williams Jr., chairman of the board of directors, from active management of the company. Mr. Williams joined Koppers interests in 1920 as manager of the Melcroft Coal Co. He was elected vice president of Koppers Coal Co. in 1927, when the Melcroft Coal Co. was absorbed, and president in 1931. He was elected executive vice president of The Koppers Co. in 1933 and became president in 1939. He occupied the dual position of chairman of the board and president from October, 1944, until April 29, 1946. Mr. Williams remains a member and chairman of the board of directors and also will serve the company as an adviser on special problems.

Westinghouse Electric Corp., Pittsburgh, Pa., has elected as vice presidents James H. Jewell, manager of apparatus sales since 1947, and John M. McKibbin, assistant to vice president and manager of advertising and sales promotion. Mr. Jewell joined Westinghouse in 1920 and was named manager of the construction industry section in Philadelphia in 1930. From 1943 to 1947 he served as manager of agency sales in the Middle Atlantic district, manager of the agency sales department for the entire company and as manager of industry sales departments. A native of Pittsburgh, Mr. McKibbin joined the Westinghouse sales promotion department in 1922 and has served as advertising manager of the company's offices at Cleveland, Detroit, for the Central district at Pittsburgh; apparatus promotion manager; and as manager of application data and training. Since 1945 Mr. McKibbin has directed Westinghouse advertising activities and was named assistant to vice president in 1944.

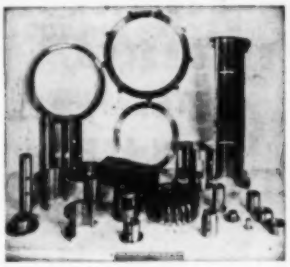
The Hockensmith Corp., Penn, Pa., has announced the retirement of Wilbur D. Hockensmith as president of the organization and his election to the newly created position of chairman of the board. At the same time, it was announced that David M. Wagoner, treasurer of the company since 1892, also had retired. Wilbur D. Hockensmith Jr., son of the retiring president, has been named president and general manager and John A. Johnson has been elected treasurer, to succeed Mr. Wagoner. Mr. Hockensmith Sr. first joined the company in 1902 and had actively served as president since 1915.

Mines Safety Appliances Co., Pittsburgh, Pa., has named Chester H. Sanderson advertising manager. A native Pittsburgher, Mr. Sanderson has been associated for over 20 years with Mine Safety's direct mail, display, and advertising departments.

Link-Belt Co., Chicago, has transferred Allan Craig, sales manager of the company's southeastern division since 1945, to Houston, Tex., as gen-

SAVE REAL MONEY
on high quality
AXLE BEARINGS
JOURNAL LINERS
BUSHINGS
WEARING PARTS

for General Electric, Sullivan, Goodman, Oldroyd, Jeffrey, Westinghouse and Joy equipment. American Crucible methods, experience, know-how, and equipment spell big savings for you. Furthermore, today's invoices are reflecting declining production and metal costs. Your inquiry can pay you handsomely.



Each part produced from

PROMET BAR STOCK Round, hexagon, square. Rough cast, semi-finished. Cored stock, all sizes (by ⅛" steps.) from ½" minimum core to 12" O.D. and 13-inch lengths. 8 to 1 grades of hardness.

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McCLURE, VA., The Erwin Supply & Hardware Co. .....
LORAIN, OHIO, The American Crucible Products Co. ..... Phone 6983
TERRE HAUTE, IND., The Mine Supply Co., Inc. ..... Phone Crawford 8150

Other Representatives

ALTON, ILL., Frank E. Rhine, 623 Blair Ave. ..... Phone 3-8624
BIRMINGHAM 3, ALA., F. B. Keiser, Jr., 1608 First National Bldg. ..... Phone 7-2383
MT. LEBANON, PA., J. E. Nieser, 720 Roselawn Ave. ..... Phone LE-9876
NEW YORK CITY, Trans American Commerce Co., Inc., 165 Broadway ..... Phone 7-4340

CLEAN COAL MAKES FRIENDS

Dustproof your coal with WYANDOTTE CALCIUM CHLORIDE

• Coal treated with Wyandotte Calcium Chloride makes a hit with both dealers and householders. They like its freedom from dirt and dust . . . the ease of handling it. And they'll bear you in mind when it comes to further purchases.

Dustproofing coal with Wyandotte Calcium Chloride is safe, economical, easy. A little does a lot to produce that special sheen that means sales appeal. When you dustproof coal you automatically freezeproof too!

More information about this process is yours for the asking. Just mail the coupon for full information and literature about Wyandotte Calcium Chloride.

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Michigan Alkali Division
Wyandotte, Michigan
Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.
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REG. U. S. PAT. OFF.
WYANDOTTE CHEMICALS CORPORATION
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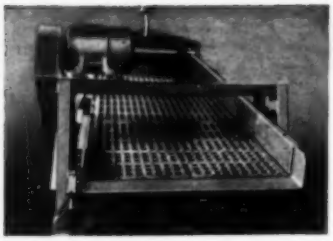
Hendrick PERFORATED METAL PLATE

on a gyrating screen



This popular heavy-duty scalping unit is equipped with a 5' x 14' Hendrick metal plate with square perforations.

Hendrick Perforated Plate can be supplied, either flat or corrugated, with any desired shape and size of perforation, in tank, high carbon, high tensile, and abrasion-resisting steels, and in other commercially rolled metals.

It maintains uniformity of mesh throughout an unusually long service life. Its full clearance obviates clogging, and the ease with which decks can be changed minimizes labor costs. Write for detailed information.

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HENDRICK

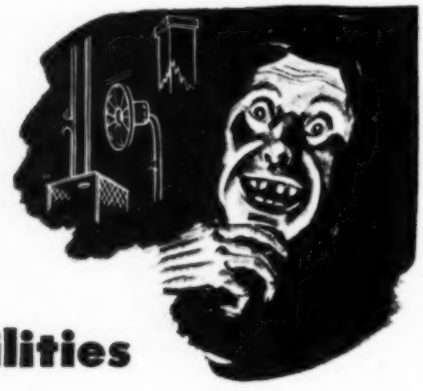
Manufacturing Company

41 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Mitco Open Steel Flooring
"Shur-Site" Treads and Armorgrids

FATE laughs at probabilities



Probably those underground mine timbers are free from decay . . . *probably* the mine's ventilating system is in good working order . . . *probably* the elevator shaft cables are safe . . . but you can never be sure of complete mine safety with "probabilities."

Bituminous Casualty Corporation removes all doubt concerning mine safety with its extensive Safety Engineering Program. Available to Bituminous Workmen's Compensation policyholders, this program helps save lives and reduce the frequency and severity of accidents. It includes regular mine inspections . . . analysis of mine hazards . . . survey recommendations . . . accident prevention activities . . . reduction of operating expenses resulting from accidents . . . and establishment of production efficiency.

Mine owners, operators and workers alike are served by Bituminous Casualty Corporation and its Safety Engineering Program.

BITUMINOUS CASUALTY CORPORATION

ROCK ISLAND ILLINOIS

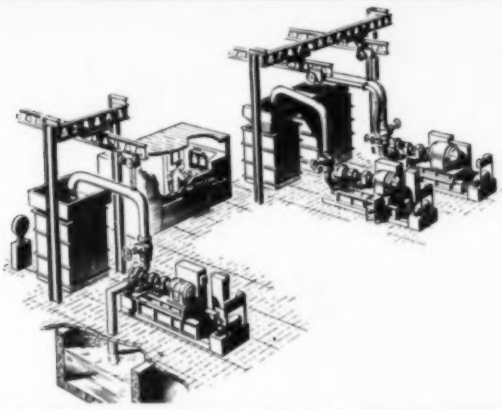
SECURITY WITH SERVICE

eral manager of the southwestern division, where a new Link-Belt plant is about to be opened. Michael J. Perry, district manager at Moline, Ill., since 1946, has been appointed sales manager, southeastern division, with headquarters at the Atlanta plant, to succeed Mr. Craig. Andrew K. Kolar, district sales engineer at Moline, Ill., since 1947, has been appointed district manager, in full charge of this office.

Caterpillar Tractor Co., Peoria, Ill., has announced the realignment and expansion of its general sales department and the expansion of its advertising department. H. H. Howard, general sales manager, assumes the title of director of sales, with J. J. Valentine and J. H. Mohler as assistant directors. Mr. Valentine, formerly assistant general sales manager, will have administration of Eastern, Central, Western and governmental sales divisions. Mr. Mohler, formerly manager of sales training division, will administer sales development division and sales training division, along with two newly created divisions, sales engineering and market research. W. N. Foster, assistant Eastern division sales manager, becomes manager of the new sales engineering division, while L. J. Deyo, former assistant to J. J. Valentine, heads up the market research group. K. F. Ames will succeed Mr. Mohler as sales training division manager and will be succeeded as assistant manager of the Central sales division by J. M. Abbey, formerly a district sales representative in the division. Mr. Foster is succeeded as assistant Eastern division sales manager by C. K. McClelland, formerly a district representative in the Central division. In the advertising department, George E. Wennerlyn has been named assistant to W. K. Cox, advertising manager. Burt Powell, formerly manager of publicity and sales publications division, has been promoted to assistant advertising manager.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has appointed J. M. Haile and R. F. Garity to succeed each other as Eastern industrial territory and Northwest industrial territory managers, respectively, for the A-C tractor division. Mr. Haile, who joined Allis-Chalmers in 1939, was promoted to assistant industrial equipment manager on his return from war service in 1946 and he became a territory manager last year. Mr. Garity was appointed industrial sales manager of the company's Omaha branch in 1944 and in 1946 became district manager for the company's Minnesota territory. He was promoted to Northwest industrial territory manager early this year.

General Electric Co., Schenectady, N. Y., has appointed James H. Goss manager of engineering in the control divisions of the apparatus department. Mr. Goss, who joined GE in 1931, has been assistant manager of



Allis-Chalmers Expands Pump-Testing Facilities

SIMPLIFIED ARTIST'S SKETCH of a portion of a new centrifugal-pump test floor, said to contain the most efficient and accurate commercial-pump test facilities ever developed, recently put into service at the West Allis Works of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. Providing both maximum testing accuracy and minimum testing time and expense, the new set-up is designed to be of material assistance in the company's long-standing policy of obtaining and maintaining on file complete performance data on every pump it builds. In addition to an improvement in pump shipment time through the reduction of test time, the more accurate data provided by the facilities are expected to be of considerable value to both pump designers and users. The test floor includes some new applications of equipment worked out by Allis-Chalmers engineers in conjunction with equipment manufacturers as well as devices designed and built by Allis-Chalmers especially for this application.

Proper bonding keeps power costs low . . . and MESCO rail bonds guarantee perfect bonding. MESCO bonds prevent power "leaks" and assure full conductivity at all times. 18 types meet every requirement. Write for details.

Type MB-F

Mosebach Electric & Supply Co.
1115 Arlington Avenue Pittsburgh 7, Pa.
HEmlock 8332

engineering for the divisions since December, 1947.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa., has elected as president J. W. Kinnear Jr., executive vice president for nearly two years and a director for 15 years, succeeding L. Gerald Firth, resigned. Mr. Kinnear is the son of one of the founders of the company, J. W. Kinnear Sr., who, with Lewis Firth, founded the Firth Sterling Steel Co. in 1896. Mr. Firth, who succeeded his father, Lewis Firth, as president and general manager in 1933, will continue as a member of the board of directors and director of research and development.

Walter Motor Truck Co., Queens, L. I., N. Y., has elected Clinton A. Misson, formerly with the U. S. Navy, president and a director, succeeding the late L. G. Stelzle. Maurice Walter, son of the founder and associated with the company for 30 years as chief engineer and vice president, has been named chairman of the board of directors, in addition to his position as vice president.

LeRoi Co., Milwaukee, Wis., has named Thomas V. Shea, former Eastern district manager, general sales manager, succeeding J. M. Dolan, who is now vice president and general sales manager, Hydraulic Press & Equipment Mfg. Co., Mt. Gilead, Ohio. J. E. Heuser, for many

NAGLE PUMPS
For ABUSIVE SERVICE

These are only a few of the well-known companies that have put Nagle Centrifugal Pumps to the test . . . . and found them outstanding for longer, trouble-free, low-maintenance service.

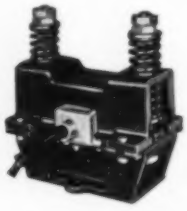
Simplicity of design, accessibility of moving parts, careful selection of the best impeller for the specific job, and selection of the best material to resist the corrosive or abrasive action. These are all factors contributing to Nagle Pump's leadership on abusive jobs. Send for Bulletin 4711.

Nagle Pumps
INDUSTRIAL PUMPS FOR ABUSIVE APPLICATION
1237 CENTER AVE.
CHICAGO HEIGHTS, ILL.

For Material Handling "KNOW-HOW" Call on SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS



Keep Bins, Hoppers and Chutes Open and Free-Flowing

These heavy-duty Vibrators with variable control of power can be attached to most any type and size of bin, hopper or chute.

Operate from 110 volt, 210 volt or 440 volt A. C.

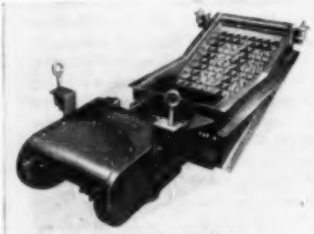
Can be tied in with bin gate to start and stop automatically—ON when the gate is open—OFF when it's closed.

Write for literature

SYNTRON CO.

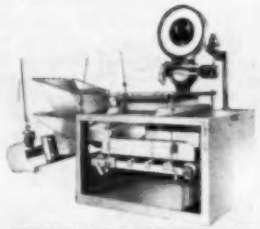
975 Lexington, Homer City, Pa.

VIBRATING GRIZZLIES
Both Feed and Scalp With One Unit



VIBRATING SCREENS
Wet or Dry — Single or Multiple Decks

VIBRATORY FEEDERS
Up to Hundreds of Tons per Hour — Rheostat Control of Flow



"CONSTANT WEIGH" FEEDERS
Accurate, Continuous Feed by Weight

years in original-equipment manufacturer and distributor sales, has been placed in charge of all industrial engine sales. E. F. H. Dutton, formerly representing the company in the foreign sales department, has replaced Mr. Shea as Eastern district manager. Clyde R. Schuler, associated with the Hercules Motor Co. for the past 20 years, has been appointed to handle LeRoi engine sales to equipment manufacturers in the Michigan-Ohio area.

Goodyear Tire & Rubber Co., Akron, Ohio, has appointed L. W. Adams, since 1943 a Boston field representative, mechanical-goods district manager at Pittsburgh. H. L. Montgomery has been named mechanical-goods district manager for the company's newly created district at Cincinnati, Ohio. Associated with the company since 1925 and formerly located at Detroit in mechanical-goods sales, Mr. Montgomery will operate the new district under direction of O. A. Schilling, Eastern sales manager.

Thew Shovel Co., Lorain, Ohio, will celebrate its 50th anniversary as a corporation on July 17. The company's actual operation began 54 years ago, when Capt. Richard P. Thew designed and built the first full-revolving shovel in 1895. It today operates five plants and employs 1,500 people, concentrating its engineering and productive facilities solely on the manufacture of power shovels and cranes.

Homelite Corp., Port Chester, N. Y., has opened a new branch office at 810 Ridge Ave., Pittsburgh 12, Pa., to cover western Pennsylvania, West Virginia and eastern Ohio. William Livingston, formerly a representative in eastern Pennsylvania, has been put in charge of the new office, which will carry an extensive stock of Homelite products and parts.

American Hoist & Derrick Co., St. Paul, Minn., has appointed John E. Carroll general sales manager. Mr. Carroll, who originally joined American Hoist in 1937 as a district sales representative, has returned to the company following his association as partner with Harron, Rickard & McCone Co., of Southern California.

Harnischfeger Corp., Milwaukee, Wis., has appointed George L. Staudt advertising and sales promotion manager. Mr. Staudt was formerly director of advertising for Standard Register Co., Dayton, Ohio.

Reliance Electric & Mfg. Co., Cleveland, Ohio, has appointed additional field sales application engineers in its sales offices, as follows: Robert C. Suttle, Cincinnati; Robert L. Potter, Pittsburgh; Eugene H. Sowers, Philadelphia; J. Robert Zahn, Cleveland; Robert Magnetti, Chicago; and Robert B. Reed, Birmingham, Ala. Clyde F. Giegel, who has served Reliance in

For STRENGTH specify

TRI-LOK

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OPEN STEEL FLOORING

The locked-in strength of Tri-Lok enables it to stand up under heavy loads—even on long spans. No rivets, bolts, or welds are used in the construction of Tri-Lok; this feature eliminates the possibility of loose joints.

Tri-Lok is also available in Diagonal, or Super-Safety U-type Flooring, and in Stair Treads of all types. Write for Bulletin KR 1140.

DRAVO CORPORATION

National Distributor for the Tri-Lok Company

Dravo Bldg., Pittsburgh 22, Pa.

Sales Representatives in Principal Cities

DRAVO

SCREENS FOR EVERY COAL PREPARATION JOB

•STAINLESS STEEL
•ALL WELDED CONSTRUCTION
•NON-BLINDING

BEE ZEE

BUILT TO YOUR SPECIFICATIONS

BIXBY • ZIMMER ENGINEERING CO.

961 Abingdon St. • GALESBURG, ILL.

various capacities for several years, has joined the Pittsburgh office as a field service engineer. Albert M. Cherry, for the past two years in the company's general sales offices in Cleveland, has moved to the Rockford, Ill., sales office.

Stoody Co., Whittier, Calif., has named as distributors the Mobile Welding Supply Co., Inc., 2 Government St., Mobile 12, Ala.; and Morris, Wheeler & Co., Inc., Fox St. & Roberts Ave., Philadelphia 29. Amos Johnson, active for many years in the welding industry of the Northwest, has joined Stoody's field sales department and will work with Stoody distributors in Minnesota and the Dakotas.

International Harvester Co., Chicago, has appointed J. G. Wiegand and R. R. McKiel sales engineers specializing in the sales of International Harvester industrial-power products to manufacturers.

Dravo Corp., Pittsburgh, Pa., has appointed A. J. Morrison, with the company since 1917, manager of the shaft and tunnel department.

●

Trade Literature

Available Without Charge on Request to the Manufacturer

BATTERY CHARGERS — Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio. Bulletin 234 describes and illustrates the Type S single-circuit mg automatic battery-charging units available in a variety of capacities for both lead-acid and Edison batteries. Installation and operating features and specifications are included.

BUSWAY—Trumbull Electric Mfg. Co., Plainville, Conn. Circular 152 explains the product features and advantages of LVD (Low Voltage Drop) Flex-A-Power, described as a busway that is used principally as feeder lines for the transfer of heavy current or as main feeders for power and light. Construction, sizes and ratings installation and application data are included.

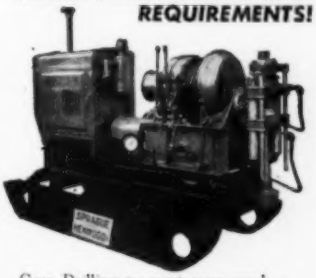
CAR RETARDER—The McNally-Pittsburgh Mfg. Corp., Pittsburgh, Kan. Bulletin 610 describes the new McNally-Pittsburgh all-steel-frame car retarder and covers features, installation and operation, with section diagrams of retarder installations for both air-valve and air-electric control illustrating the general arrangement of retarder, car cable, tiller ropes and controls.

CAR SHAKER—Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Bulletin 07B7221 covers construction features, installation data and specifications on the new A-C car shaker, designed for greater safety and speed in unloading of coal and other granular materials from all sizes of drop-bottom hopper cars operating in North America.

CASTINGS—Frank Foundries Corp., Moline, Ill. Brochure commemorating the 50th anniversary of the company outlines its history, illustrates and describes its facilities and service for

WHAT ARE YOUR CORE DRILLING DEMANDS ?

SPRAGUE & HENWOOD, INC. MEETS YOUR INDIVIDUAL REQUIREMENTS!



Core Drilling *to meet your needs*—that is a special advantage of Sprague & Henwood's Core Drilling Machines, designed to perform the work expected of them. They are modern in every respect . . . are engineered to meet the strenuous demands of present day core drilling jobs . . . and construction enables them to withstand long, rugged service at high speed! Available with two distinct types of swivel-heads: "Screwfeed" and "Hydraulic."

You will profit by the many features offered in Sprague & Henwood's Core Drilling machines. For full details and advantages write us today.

BORTZ

Diamond Bits

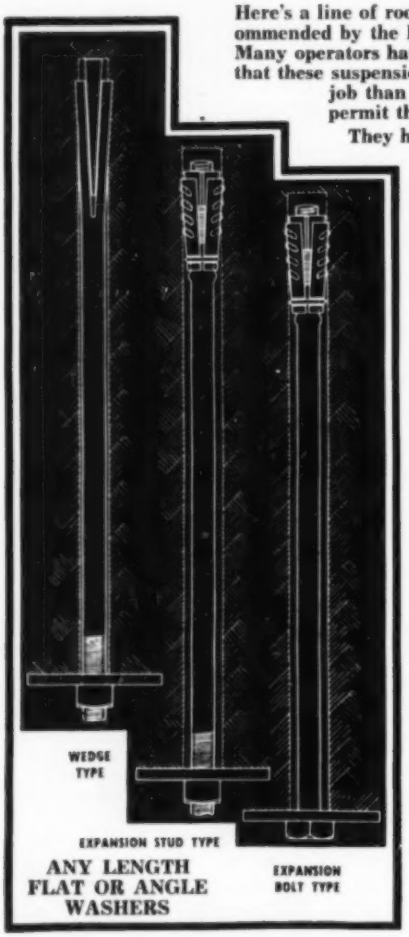
Are also manufactured by Sprague & Henwood, Inc. . . . full details sent on request.

Also
Core drilling by contract

Sprague & Henwood, Inc.
DEPT. X
SCRANTON 2, PA.

FOR MODERN • SAFE • ECONOMICAL ROOF SUPPORT • *Specify*

WEST VIRGINIA SUSPENSION BOLTS



Here's a line of roof supports which are recommended by the Federal Bureau of Mines. Many operators have found from experience that these suspension bolts do a better, safer job than timbers where conditions permit their use.

They have also been found more economical than timbers and more susceptible of a higher percentage of recovery. Another advantage is that they eliminate obstruction hazards common to timbered mines.

"Hold yourselves up by the boot straps" might aptly apply to this modern method of roof support.

These bolts are available in wedge stud type, expansion unit stud type and the expansion unit bolt type to meet the needs of various mining conditions. We also make the channel supports, washers and other accessories used with these bolts.

Our line of products includes prefabricated track—roof suspension bolts—rail benders—slate bars—and miscellaneous mining products. Consult one of our conveniently located representatives for complete details.

★

WEST VIRGINIA STEEL & MFG. CO.

HUNTINGTON, WEST VIRGINIA

supplying Frankite "tailor-made" alloyed gray-iron castings to a wide variety of industries. Manufacturing practices and construction features of various types of castings are discussed and illustrated and the application of Frankite castings to a wide range of products is shown.

CENTRALIZED LUBRICATION—The Farval Corp., 3249 E. 18th St., Cleveland 4, Ohio. Bulletin, "Studies in Centralized Lubrication," features application of Farval centralized lubricating systems to various industries, with details of savings in labor of oiling, savings in lubricant consumption, elimination of down time and increase of machine production.

COAL CRUSHERS—American Pulverizer Co., 1119 Macklind Ave., St. Louis 10, Mo. Bulletin covers features, operation and specifications of AC Rolling Ring crushers, said by the company to be capable of crushing coal at a cost of less than 1c per ton. Available in capacities from 50 to 500 tph, the crushers feature greater flexibility of sizing with uniform high tonnage.

COAL CRUSHERS—The McNally-Pittsburg Mfg. Corp., Pittsburg, Kan. Bulletin 416 describes the complete line of McNally-Pittsburg coal breakers and coal crushers and includes dimension diagrams, capacity tables, comparative stoker-coal crushing data and illustrations of each type, plus data on the new rotary breaker recently installed at two plants.

CONVEYOR BELTING—B. F. Goodrich Co., Akron, Ohio. Bulletin describes and features illustrated case studies of successful applications of the Goodrich "Giriptop" conveyor belts, designed for conveying materials at angles of incline too high for conventional belts. The material is gripped by 1,000 projecting fingers on each square foot of the belt's surface and the belting is said to unload small-sized coal over portable conveyors and up inclines as high as 28 deg.

DELAY BLASTING—Atlas Powder Co., Wilmington 99, Del. Bulletin "Rockmaster 16 Blasting System," describes the Atlas System of milli-sec delay blasting and includes 20 sketches of typical drill-hole and detonator layouts for both stripping and underground mining, using the newly expanded Atlas series of 16 Rockmaster electric detonators designed to fire at milli-sec intervals, with the entire group firing in 550 one-thousandths of a second.

DRILL BITS—Firth Sterling Steel & Carbide Corp. Mining Division, Dept. CA, McKeesport, Pa. Price lists illustrate and provide specifications, sizes and prices on Firthite mining tools, including undercutter coal bits, auger drill bits and finger bits. Two new shop cards on "How to Regrind Cutting-Machine Tools" also available from the company contain instructions illustrated with large, easy-to-understand photographs and are printed on 6-ply 11x15-in. cardboard laminated with plastic for posting on the wall near the tool grinder.

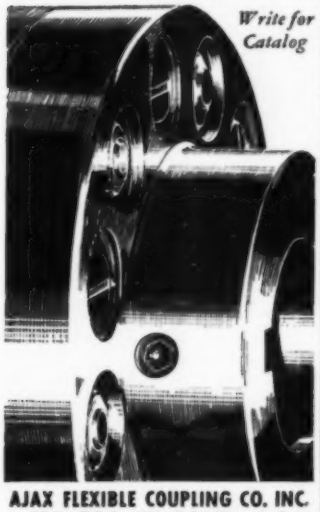
DRYER-AIR HEATING SURFACE—Geo. P. Reintjes Co., 2517 Jefferson St., Kansas City, Mo. Bulletin 449 describes the operation and advantages of the company's line of furnaces for heating air for the removal of surface moisture from prepared coal. The construction and features of the McNally-Reintjes furnace are illustrated and described.

EARTHMOVER — The Frank G. Hough Co., 735A Sunnyside Ave., Libertyville, Ill. Bulletin, "Four Wheel Drive Is Here," features the new Hough Model HM Payloader tractor shovel, with action views of the unit digging, loading, grading and carrying. Construction, operation and specifications of the 1½-cu yd 76-hp rubber-tired tractor shovel are included.

ELECTRICAL - BONDING EQUIP-

AJAX FLEXIBLE COUPLINGS

Standard Equipment on America's finest Direct-Connected Machines



Write for Catalog

AJAX FLEXIBLE COUPLING CO. INC.
17 English St., Westfield, New York

DISCLOSES SECRET . . .

. . . of his buying know-how

Mr. J. T. Tobin, shown above, is only too happy to tell the "secret," now known to thousands, of how a regular McGraw-Hill service helps him in his job.

Mr. Tobin is an Engineer with the Gulf Smokeless Coal Company of Tams, West Virginia. As such, he is in constant need of specific buying information on all types of mining machinery, equipment, supplies and services.

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MENT—Electric Railway Improvement Co., 2070 E. 61st Place, Cleveland 3, Ohio. Catalog 549 describing equipment and process for Cadwell mine bonds shows the various types of steel and copper arc-weld bonds designed for use on joint bars, conductor cable, angle bars, wood and steel ties, along with cross bonds and bonding rheostats, and covers the new Cadwell process described as a method of welding bonds to either steel or copper in which no outside source of heat is required.

GENERATORS—Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Bulletin 05B6031B discusses Allis-Chalmers high-speed coupled-type ac generators and covers construction features of both the bracket- and pedestal-type-bearing synchronous generators, along with a table of ratings of standard bracket-bearing generators.

HARD-SURFACING—Lincoln Electric Co., Cleveland 1, Ohio. Bulletin 469 lists applications for Lincoln hard-surfacing electrodes, together with their properties and procedures for use.

HOSE CLAMPS—Hose Accessories Co., 17th & Lehigh Ave., Philadelphia 32. Bulletin 125 covers the line of LE-HI hose clamps available in 160 different sizes and types to fit various industrial and construction hose, including universal-type hose clamps, single- and double-bolt clamps for shank-type couplings, interlocking-type- high-pressure clamps in sizes up to 4 in. oversize, double-bolt and band-type hose clamps and a series of new undersize high-pressure hose clamps (interlocking type) designed to fit new hose types with smaller outside diameters.

MINING MACHINERY AND EQUIPMENT—Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa. A number of new bulletins recently announced as available offer descriptions and illustrations of the construction, features and application of various Joy products, as follows: Axivane mine fans, Bulletin J-403; 3-JCM continuous miner, J-400; belt feeders, LD-101; AD-1 coal borer, C-45; hydraulic cable reel, J-201; Joy products for coal mines, M-203; CLE-5 and CLA-5 longwall cutters, C-37; 12BU-8PN longwall loader, J-106; mine-air compressors, A-53; mining-machine trucks, J-300; CD-26 mobile coal drill, C-44; postpuller, J-301; Sulmet bits, C-42; safety coal drill, C-43; Tailored-Temper bit plant, RES-58; timber setter, J-302; 10RU trackless coal cutter, C-33; trackless equipment for mines and tunnels, J-107; shuttle cars, J-200; and the 11RU universal cutter for low coal, C-41.

MINING AND PREPARATION MACHINERY AND EQUIPMENT—Jeffrey Mfg. Co., Columbus 16, Ohio. Several new bulletins recently announced as available contain descriptions and illustrations of the construction, features and application of Jeffrey products, as follows: precision-built babbitted bearings, Folder 814; blowers for underground service, Bulletin 813; Type 12A Aerodyne mine fan, Folder 821; heavy-duty double-roll crushers, Bulletin 816; cable-reel shuttle cars, Catalog 816; and slack-handling device for Jeffrey shortwalls, Folder 819.

LABORATORY CRUSHERS AND GRINDERS—American Pulverizer Co., 1119 Macklind Ave., St. Louis 10, Mo. Bulletin offers capacities, ratings and dimensions of the complete line of laboratory crushers, grinders and shredders designed to reduce a wide variety of materials to meet specific testing needs, with illustrations and blueprints showing specifications and construction of the units.

MASONRY LEAKAGE—Stonhard Co., Dept. CA, 1306 Spring Garden St., Philadelphia 23. Folder describes features of Stonhard Stontite, designed to stop leaks—from actual breaks to hair-crack

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METAL COATING—Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y. Bulletin 62 illustrates and describes the application of metallizing to wide variety of iron and steel equipment to provide an anti-corrosion covering said to increase life of the equipment and reduce maintenance.

PUMP CONTROLS—Cutler-Hammer, Inc., 220 N. 12th St., Milwaukee 1, Wis. Bulletin, "Precision Control for Pumps," describes the wide range of Cutler-Hammer control for domestic, commercial and industrial water systems, including data on controls for domestic water systems, deep wells and small compressors, deep-well pumps and large compressors, standard - duty sumps and tanks, cellar-drain and other light duty sumps.

SHOP PRESSES—Rodgers Hydraulic, Inc., St. Louis Park, Minneapolis, Minn. Catalog 313 includes illustrations, construction and operation features and specifications on the complete line of Rodgers standard and special shop presses from 60 to 400 tons and also offers descriptions of hand and power pumps and press accessories.

SHUTTLE-CAR CABLE — Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass. Bulletin describes and illustrates construction of the new Simplex-Tirex shuttle-car cable, featuring a conductor insulation and jacket interlocked by vulcanizing and a rib construction that prevents twisting of conductors.

SOLIDS-HANDLING PUMPS—Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Bulletin 08B6381C covers the A-C Type CW solids pumps and includes construction, design and maintenance features, along with specifications and dimensions of the line which is available in eight sizes to provide capacity range from 175 to 10,000 gpm with heads up to 140 ft. Although the pumps are assembled and stocked with end suction and top vertical discharge, their design is said to permit six alternate discharge-nozzle positions easily set up in the field.

STORAGE - BATTERY MAINTENANCE—Gould Storage Battery Corp., Trenton, N. J. Reprints of articles appearing in current national trade magazines on battery maintenance available include those on the maintenance of both cycle-duty and stationary batteries. The stationary-battery reprints contain information on both installation and maintenance techniques and the cycle-duty battery reprints discuss eight primary rules of battery maintenance.

SYNCHRONOUS MOTORS — Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Bulletin 05B6112A describes operating advantages and construction features of A-C bracket-bearing synchronous motors in sizes from 30 to 1,000 hp. In addition to a complete line of standard open-type synchronous motors, Allis-Chalmers builds motors with special features for virtually any service requirements, the bulletin points out. These include units with grease-lubricated anti-friction bearings, enclosed collector assemblies, semi-protected, protected, dripproof, splashproof, separately ventilated, and totally-enclosed motors and vertical synchronous motors built in all sizes for pump drives and other applications, exciters and starters.

TRUCK SAFETY—Mack Trucks, Inc., 350 Fifth Ave., New York 1 (Address the Editor, *Mack Bulldog*). Poster sheets 8½x11-in. spotlighting 15 safety and courtesy rules to be observed by truck drivers, entitled "For Safety's Sake," are reprinted from the *Mack Bulldog* and are available both for posting and distribution to drivers.

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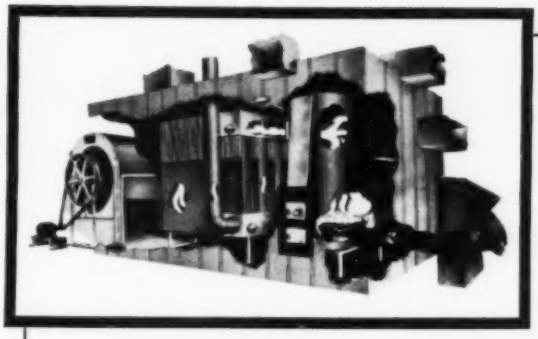

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WATER, ACID AND HYDRAULIC-CONTROL HOSE—B. F. Goodrich Co., Akron, Ohio. Catalog Section 4800 pictures and describes construction of types of water hose manufactured for a wide variety of services, lists recommended uses and gives detailed specifications and coupling information. Catalog Section 3440 covers acid hose for discharge, suction and pinch-valve service, recommends uses and features a table listing concentrations, temperatures and pressures of the various acids recommended for longest service life from the hose. Catalog Section 4030 describes uses and construction of hydraulic control hose made with special wire braid to give greater toughness and flexibility for working pressures ranging from 300 to 5,000 psi, and includes a method of calculating correct bending radii for various hose sizes.

WELDING ACCESSORIES—Air Reduction Sales Co., 60 E. 42d St., New York 17. Catalog, second of a projected series of ten, covers both oxyacetylene and electric-arc accessories, including goggles, hose, sparklighters, gloves, electrode holders, cable, weld-cleaning tools, helmets, face shields and other items.

WIRE CLOTH—Cambridge Wire Cloth Co., Cambridge, Md. New revised edition of the Cambridge woven-wire-cloth catalog offers complete specifications, descriptions and illustrations of meshes, weaves, metals and alloys included in the diverse line of industrial wire cloths and screens. In addition to various reference data for those concerned with filtering and bulk handling of materials, the booklet contains illustrations of the company's facilities and typical examples and applications of Cambridge's wire filter cloths, screens and special fabrications, such as baskets, racks and fixtures.

Caterpillar Tractor Dedicates New Diesel-Engine Plant

COMPLETION of the first major phase of its postwar expansion program was marked late in April by the Caterpillar Tractor Co., Peoria, Ill., with the formal dedication of this new diesel-engine factory especially designed, erected and equipped for the economic manufacture of the company's line of diesel engines. With an area of 825,000 sq ft within its rectangle, the factory represents 4½ years of planning by the company to provide facilities for machining, testing, shipping and other related engine work under one roof. Measuring 1,120 ft long and 757 ft wide, the plant has a floor area of 20.6 acres under the roof, employs 4 miles of conveyors and 1,400 cranes, and utilizes some 1,218 machines in the machine-shop and assembly area. Climaxing a week of open-house ceremonies from April 25-29, when 45,000 people toured the plant, the factory was officially dedicated by Illinois Gov. Adlai Stevenson before a crowd of 11,000.

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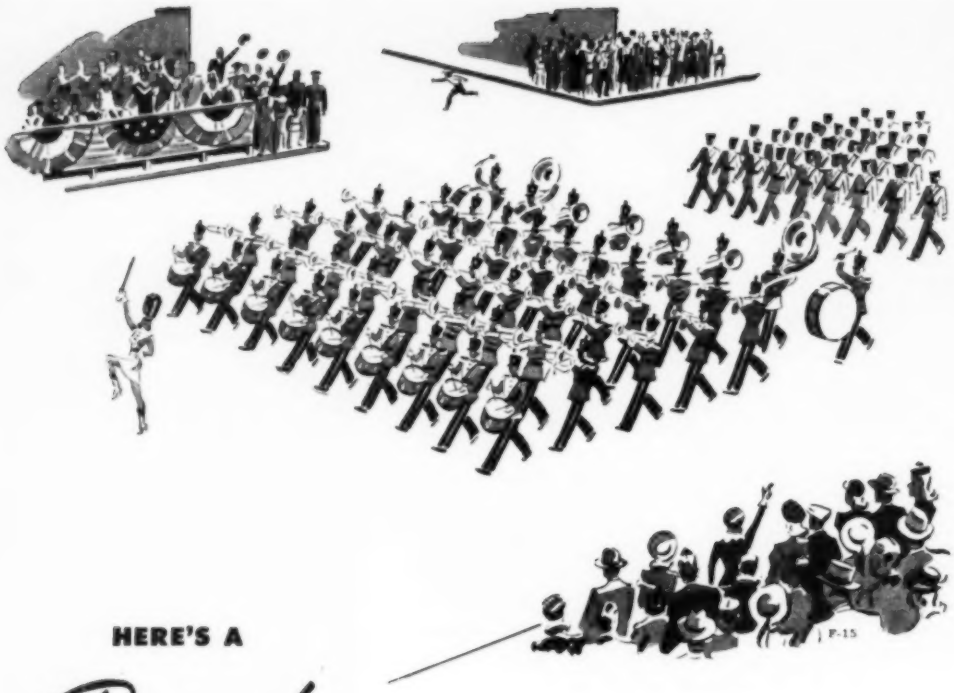

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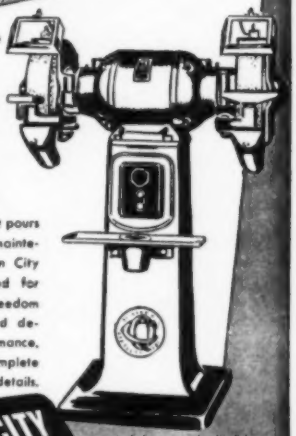

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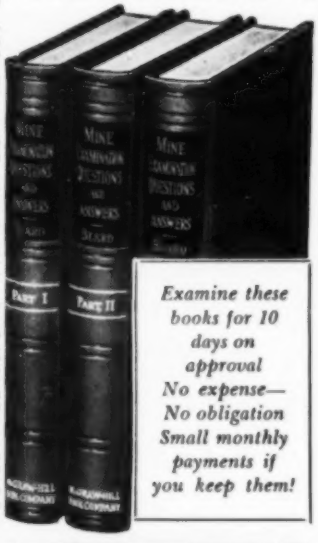

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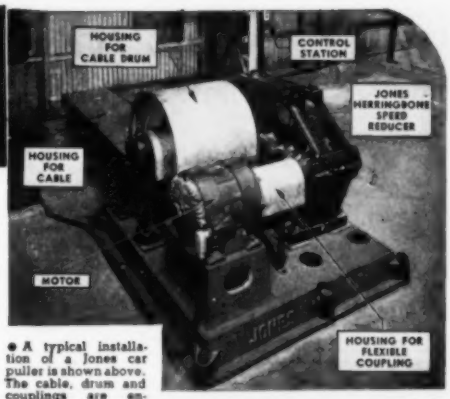

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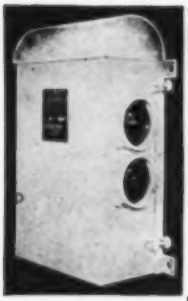


NUSSCO AUTOMATIC MINE SIGNALS

For Main Haulage • Prevent Collisions
Save Trip Time

A two wire cable connects two or more signals together into one block. Only one signal can show proceed on the entrance of a trip, all other signals show stop.

- Low in Cost.
- Easy to Install.
- Write for Catalog.

NACHOD & UNITED STATES SIGNAL CO.
INCORPORATED
4771 Louisville Ave., Louisville, Ky.

CESCO ELECTRICALLY OPERATED TRACK SWITCH

Thrown by Motorman
Operates Switch Safely • Saves Time and Money

This modern track switch is thrown swiftly and safely by motormen as they sit in their cabs. It saves time and money, and is fool-proof and dependable!

Over 40 years experience manufacturing
ELECTRIC TRACK SWITCHES

Write for Catalog
CHEATHAM ELECTRIC SWITCHING DEVICE CO.
INCORPORATED
4780 Crittenden Drive, Louisville, Ky.

Contract Core Drilling

Exploration for coal and other mineral deposits. Foundation test boring and grout hole drilling for bridges, dams and all heavy structures.

Core Drill Contractors for more than 60 years

JOY MANUFACTURING CO.
Contract Core Drill Division
MICHIGAN CITY, INDIANA

PERFORATED METAL
COAL MINING SCREENS

Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.

CHICAGO PERFORATING CO.
2443 West 24th Place
CHICAGO 8, ILLINOIS
VI. 7-0757

"Sutton" SAND DRYING STOVES

The Standard for Over Forty Years

Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.

"SUTTON" FEATURES

- Simple in operation
- No skilled labor necessary
- Made in four sizes
- Lowest original cost
- Economical upkeep
- Topmost efficiency

SATISFACTION GUARANTEED
Catalog and Prices sent upon request

INDIANA FOUNDRY COMPANY
950 Oak Street — Indiana, Pa.

FLEXCO HD BELT FASTENERS AND RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

Flexco HD Fasteners make a tight, butt joint of great strength and durability . . . distribute the strain uniformly. Operate smoothly over flat, crowned or take-up pulleys. Made of steel, Monel, Everdur and Promal.

Flexco Rip Plates are for repairing and patching damaged belts.

Ask for Bulletin F-100

FLEXIBLE STEEL LACING COMPANY
4638 Lexington St., Chicago 44, Illinois

Strong, Smooth and Readily Troughing.
Order From Your Supply House

Save Labor, Reclaim Coal with "Canton" Track Cleaner . . .

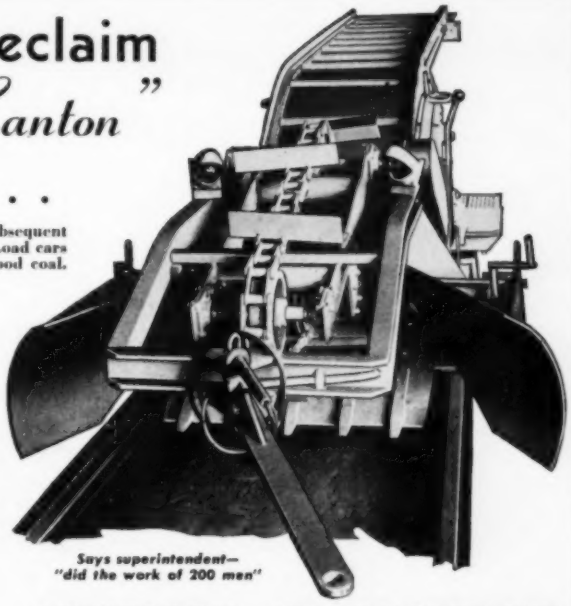
After one thorough cleaning operation, subsequent cleanings will yield good coal for reclaiming. Load cars higher, collect spillage mechanically, mostly good coal. More tonnage hauled out.

PERFORMANCE RECORD

Operating time	100 hr.
Operating 3 men	300 hr.
Cost of labor	$412.00
Distance cleaned	27,860 ft.
Cost per foot cleaned	$0.015
Cost per ton loaded	$0.465
Tons loaded	887

DIGGER PLATE raised or lowered by hydraulic pump. WINGS adjusted up or down, in or out, independent of each other. FRONT CONVEYOR floating type, handling large rock. BOOM CONVEYOR can be raised or lowered. MACHINERY protected with shear pin, quickly changed. Standard WINGS clean 48 inches from center of track gauge. Extensions to WINGS permit cleaning wider space. Length 21 ft., width to conform to haulway. Weight 6500 lbs.

Write for complete data, using Street and Zone Nos.



Says superintendent— "did the work of 200 men"

AMERICAN MINE DOOR COMPANY
2057 DUEBER AVE. CANTON 6, OHIO

BUY THE TOOL THAT'S BUILT FOR THE JOB!

$155.00

The Cincinnati TRADE MARK

ONE-MAN COAL DRILL

. . . specifically designed and built for drilling coal. Universal motor — operates on AC or DC current. Cuts costs. More power "pound for pound" — more efficiency day after day!

Write today for FREE illustrated bulletin.

THE CINCINNATI ELECTRICAL TOOL CO.
Division of The R. K. LeBlond Machine Tool Co.
2635 MADISON ROAD • CINCINNATI 8, OHIO

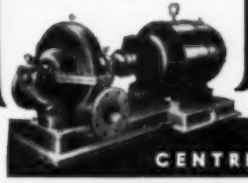
A SIZE AND A TYPE FOR EVERY LIQUIDS HANDLING JOB

APCO TURBINE-TYPE

WATER SUPPLY
CIRCULATING
NON-CLOG
DRAINAGE
IRRIGATION
BOILER FEED
REFRIGERATION
SEWAGE
ETC.

MUNICIPAL
FARM & HOME
REFINERY
DISTILLERY
CORROSIVES
BOOSTER
COND. RETURN
ETC.

PUMPS *"by Aurora"* are the product of EXCLUSIVE BUILDERS of FINE *pumps*



Write for CONDENSED CATALOG "M"

AURORA CENTRIFUGAL

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY
92 Loucks St., AURORA, ILLINOIS

One of a series of messages to help you increase your understanding of business paper advertising, and its effect on your job.

How much would NO advertising cost your company ?

SOME COMPANIES look upon advertising as an expense. When expenses have to be cut, the advertising budget looks like a good place to begin.

The only trouble with that theory is — it won't work.

Advertising can become expensive when you don't use *enough* of it. And "NO advertising" can cost far more than the "saving" it appears to create.

It's like failing to lubricate a piece of valuable machinery. You save the cost of the lubricant — but eventually there's a big repair bill to pay, not to mention your production losses while the machine is idle.

Advertising works something like a machine. It is the application of assembly-line methods to the five basic steps in the manufacture of a sale —

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Can advertising perform all five of these steps? No, it usually takes a good salesman to handle the last two. But advertising *can* save much of his valuable time.

By mechanizing the *missionary job*, advertising becomes the most efficient method of manufacturing sales at a profit. Especially when it appears in the business press, where it is concentrated among your company's best prospects — *and no one else!*

COAL AGE

is a member of The Associated Business Papers, who have published an interesting folder entitled, "How much does NO advertising cost?" We'll be glad to send you a copy. Also, if you'd like reprints of this advertisement (or the entire series) to show to others in your organization, just say the word.

Sink-Float Magnetite

"MAGNAFLOAT"

Correctly sized Magnetite for sink-float treatment of coal or other minerals. Standard grinds;

Grade A—Approximately 100 mesh with 60 to 70% passing 325 mesh.

Grade B—Approximately 100 mesh with 90% passing 325 mesh.

Other sizes to order.

Executive Offices

FOOTE MINERAL COMPANY, INC.

420—Eighteen West Chelten Bldg. Philadelphia 44, Pa.

Over 50 years grinding experience.

HOFFMAN BROS. DRILLING CO.

Diamond Core Drilling Contractors

Punxsutawney, Pa. · Tel. 382

WE HAVE SPECIALIZED IN TESTING BITUMINOUS COAL LANDS FOR MORE THAN 40 YEARS

GASOLINE • STEAM • ELECTRIC DRILLS • WE PRE-GROUT SHAFT LOCATIONS • HORIZONTAL DRILL HOLES FROM 3" TO 16" FOR DEWATERING MINES • OUR OPERATORS ARE HIGHLY SKILLED

WE HAVE ALWAYS GUARANTEED SATISFACTORY COAL CORES... We solicit your inquiries

AN AMAZING LUBRICANT

LUBRIPLATE 130-AA

Protects Against Rust and Corrosion

A super grease type lubricant! A marvelous anti-seize compound and a real protector against rust and corrosion. From the standpoint of general utility and diversity of important uses, LUBRIPLATE 130-AA is unequalled. While it is ideal for the heaviest loads, this remarkable lubricant does not cause drag and actually conserves power. Write for a free copy of the LUBRIPLATE Service Hand Book.

LUBRIPLATE DIVISION
FISKE BROS. REFINING COMPANY
Newark 5, N. J. · Toledo 5, Ohio

DEALERS FROM COAST TO COAST · *See Your Local Classified Telephone Book*

WANTED
Superintendent-Manager

For large productive strip mine in West Virginia. Good salary with bonus arrangement for right man. Write giving qualifications and experience.

P 9002, Coal Age,
330 West 42nd St., New York 18, N. Y.

WANTED

A Mine Sinking Hoist, in good condition, single keyed drum, rope speed 250-300 FPM, draw bar pull 5,000 to 6,000#, drum size 20" to 30" diameter and 24" to 30" long, solenoid motor brake and hand lever operating brake. Electric Motor driven, 50 to 60 HP, 220/3/60.

TENNESSEE COPPER COMPANY

61 Broadway New York 6, N. Y.

FOR SALE

Three portable coal preparation plants, built by Iowa Mfg. Company, Cedar Rapids, Michigan. One new and two used less than a year. These plants are package units, 200 ton per hour capacity, having crushers, screens, picking tables and loading devices for three sizes of coal, either for making stoker with oil treatment or crushed and sized mine run. These plants are located near Middlesborough, Kentucky, and for further information write to Box 138, Middlesborough, Kentucky.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** EQUIPMENT: USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

$1.20 a line. Minimum 4 lines. To figure advance payment count 5 average words as a line.

Individual Employment Wanted undisplayed advertising rate is one half of above rate, payable in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

The advertising rate is $9.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅛" vertically on one column. 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by July 15th will appear in the August issue, subject to limitations of space available.

SEND your TRANSFORMERS to ELECTRIC SERVICE CO., INC.

A financially responsible organization specializing in buying, selling, repairing, rewinding and redesigning transformers only.

Experienced personnel assures you first class workmanship and complete satisfaction.

Every transformer guaranteed for one year

The Electric Service Co., Inc.

"AMERICA'S USED TRANSFORMER CLEARING HOUSE"

MARIEMONT Since 1912 CINCINNATI 27, OHIO

1600 acres Ohio
NO. 6 STRIP COAL LAND
in low freight rate area.
BO 9278 Coal Age
520 N. Michigan Ave., Chicago 11, Ill.

FOR LEASE: 174 ACRES
LEVEL LAND, PARTLY DRILLED
OHIO STRIP COAL
Jackson Township, Mahoning County

Thirteen to forty foot overburden. No hard rock. 3½ to 4 foot good coal. On hard surface roads. Close to Railroad and within 15 miles of Youngstown. Give financial and other qualifications with inquiry. Can you drill? **Owner:**
Donald Kirk, Axis, Alabama. Phone Noble 3-7830

IF YOU ARE IN NEED

OF GOOD USED AND REBUILT MINING EQUIPMENT

Send for our latest BULLETIN *LISTING*

- LATE TYPE AC AND DC LOADING MACHINES
- LOCOMOTIVES
- AC AND DC CUTTING MACHINES
- MOTOR GENERATOR SETS
- ROTARY CONVERTERS
- STEEL TIPPLES
- ELECTRIC HOISTS
- MINE CARS, ETC.

Frank J. Wolfe—Sheldon J. Wolfe

We Specialize in Buying Outright Complete Mines that Are Going Out of Business or from Receivers in Bankruptcy, Administrators of Estates, etc.

COAL MINE EQUIPMENT SALES COMPANY

306-307 BEASLEY BUILDING L.D. PHONE 34 TERRE HAUTE, INDIANA

RAILS-TIES

TRACK ACCESSORIES

RELAYING RAIL

Immediate Shipment

500 Tons 25 Lb. ASCE
300 Tons 30 Lb. ASCE
500 Tons 40 Lb. ASCE

Standard Drillings and Lengths Can be saw cut to special lengths if desired.

MIDWEST STEEL CORPORATION

Charleston, W. Va.
Knoxville, Tenn. Portsmouth, Va.

Electrical Equipment

Converters, Motor Generator Sets, A.C. and D.C. Motors, Control Equipment and Transformers.

We build equipment to fit your requirements. Over 25 years engineering background.

C. B. LOCKE CO.
P.O. BOX 3227, TEL. 38-136
CHARLESTON, W. VA.

NEW and REBUILT

MOTORS

150 HP. 900 RPM. Elec. Mach., 220/3.60 Syn.
125 HP. 1800 RPM. West. SK. 230 v. D.C.
80 HP. 1200 RPM. Cr. Wh. 220/440/3.60 Ind.
75 HP. 900 RPM. Elec. Mach. 220/3.60 Syn.
75 HP. 1800 RPM. US 220.440/3.60 Ind.
50 HP. 1200 RPM. GE 220/3.60 Slip Ring.
5, 7½, 10 and 15 HP. AC & DC TEFC & Open.
Send Us Your Transformer Inquiries.

SYNCHRONOUS ROTARY CONVERTERS

Qu.	KW	Make	Speed	DCV
		6 ph. 60 cycle		
1	500	G.E.	1200	600
1	300	G.E.	1200	600
1	300	G.E.	1200	275
3	175	G.E.	1200	275
		3 ph. 60 cycle		
1	175	G.E.	1200	275
1	75	G.E.	1800	275

EVERYTHING FOR THE TRACK FROM
SWITCH TO BUMPER

R. R. TIE PLATES
Excellent Relay
100,000 6½" x 9½" for use with 70± to 80± Rails.
50,000 7½" x 10½" for use with 85± to 115± Rails.

MORRISON RAILWAY SUPPLY CORP.

RAND BLDG. BUFFALO 2, N. Y. EMPIRE BLDG. BIRMINGHAM 3, ALA.

RAILS — CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK

480 Lexington Ave. New York, N. Y.
810 Park Bldg., Fifth Ave. Pittsburgh 22, Pa.
Reno, Nevada Carnegie, Pa.

LOCOMOTIVES

1—10 Ton Jef. with MH110, 250 V. Motors.
1— 8 Ton G.E. with HM839 BB Motors.
1— 8 Ton Jef. with MH100, 250 V. BB Motors.
2— 6 Ton Jef. with MH88 Motors.
1— 6 Ton G.E. with HM823 BB Motors.
1— 5½ Ton Ironton Battery.

CUTTING MACHINES

1—29LE Jef. arc wall, turnover head.
2—29C Jef. 250 V. arc wall on Cats.
2—35BB Jef. 250 V. D.C. Short Wall.
1—35BB Jef. Short Wall, A.C.
3—35B 250 V. D.C. Short Wall.
1—124EJ Goodman Slabbing, D.C.
1—112AA Goodman Short Wall.
3—Short Wall Machine trucks on Cats.

LOADING MACHINES

3—14 BU D.C. on Cats.
1—7 BU Joy D.C. on Cats.
3—8 BU Joy D.C. on Cats.

SHUTTLE CARS

1—42E Joy Cable Reel.
2—32E Joy Cable Reels.
1—6 80"-18NC Joy Cable Reel. (New).

We have Motor Generator Sets, Crushers, Motors, Pumps, Compressors, Rotary Converters, etc.

TIPPINS MACHINERY CO.
PITTSBURGH 6, PA.

HIGH GRADE TOOLS

36"x26" Lodge & Shipley Patent Head Lathe.
□5B Brown & Sharpe, Plain Milling Machine.
36"x24" American Internal Face Plate Drive Engine Lathe.
□41-CX Racine Hyd. Hack Saw.
□2-12 Arter Surface Grinder.
24", 30" Bullard Vertical Turret Lathe.
2' to 7' Plain Radial Drills.
16" and 24" G. & E. Shapers.
18"x54" centers Lodge & Shipley, late type, Lathe.
120 A 51 Gardner Opposed Wheel Grinder.
24"x168" centers Sidney 16 speed Geared Head Lathe.
American Pacemaker Lathe, 16"x78" M.D.
Gisholt □4L Turret Lathe.

Also various other machine tools.

Send us your inquiries

Cincinnati Machinery Company, Inc.
217 E. Second St. Cincinnati 2, Ohio

RELAYING RAIL

All Sizes

Track Accessories

LEFTON INDUSTRIAL CORP.
Genl. Office: 212 Victor St.
St. Louis 4, Mo.

NEW and REBUILT
STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Ton 12" to 56" Track Gauge

GREENSBURG MACHINE CO.
Greensburg, Pa.

IN STOCK

USED D.C. MOTORS

7½ hp. G.E. 230 v.—450/1350 r.p.m.
7½ hp. G.E. 1 v.—600/1300 r.p.m.
7½ hp. G.E. 230 v.—1150 r.p.m.
5 hp. C-W Vertical, 230 v.—960 r.p.m.
5 hp. G.E. 230 v.—450/1800 r.p.m.
5 hp. West. 220 v.—835 r.p.m.
1 hp. G.E. 230 v.—525/2100 r.p.m.
1 hp. G.E. 230 v.—1150 r.p.m.

AVAILABLE FOR IMMEDIATE SHIPMENT
ALL MOTORS TESTED AND "IN STOCK"

FALK MACHINERY COMPANY
18 Ward St., Rochester, N. Y.
HAmilton 8745

TO HELP YOU

SELL WHAT YOU NO LONGER NEED

"Searchlight" Advertising

GENERATORS—DIESEL
3—D-13000 Caterpillar Diesel Generators, 75 KW, 440 volts A.C.
1—D-4400 Caterpillar, V-belted to 30 KVA A.C. Generator.

LARRY CARS
4—Connellsville Larry Cars, Trolley Operated, 6 Ton Capacity.

PIT CARS
150—Card Iron Works R.B. Pit Cars, 36" Gauge.
1—Card Iron Works Rock Car, 90 Cu. Ft. Capacity.

HOISTS
1—No. 22 Vulcan, with Man Cage, 30' Steel Headframe and 40 HP Single Speed Induction Motor, equipped with Solenoid Brake (Hoist purchased new in 1942).
1—Single Drum Gasoline Hoist, direct connected to 2⅝ x 4¼ Wisc. Gas Engine.
1—3-Drum Ingersoll-Rand Slusher Hoist, Model 50-NNN, with built-in 50 HP Gen. Elec. Type K Motor, 3 ph., 60 cy., 220/440 volts, complete with starter and 2—1½ yard Crescent Scrapers (used 2 months).

DRILL PRESSES
1—26" Hamilton Heavy Duty Drill Press, line-shaft drive.
1—Kennedy-Otto Drill Press, with 1 HP Gen. Elec. Vertical gearhead motor, 3 ph., 60 cy., 220/440 volts.

TROLLEY LOCOMOTIVES
2—7½ Ton Goodmans, 36" Gauge, 250 volts D.C.

MAGNETIC PULLEYS
1—24" Conveyor, 5'6" Centers, equipped with 18" dia. x 26" face Dings Magnetic Pulley, with charger. Unit driven by 1 HP., 3 ph., 60 cyc. Gen. Elec. Gear Motor.
2—24"x26" Dings Magnetic Pulleys, 250 volts D.C., without chargers.

WAGON DRILLS
1—Ingersoll-Rand, with drifter, all on pneumatic tires, used about 6 months.
1—Sullivan #1W-6, with drifter, on steel wheels. A.C. Motor.

COAL CRUSHERS
1—36" American Ring Type.
1—24x20 Jeffrey Swing-Hammer Mill.

BELT CONVEYORS
1—24", 15' Long, with Dings Pulley.
1—30", 30' Long, with 2 HP Gearhead Motor, New Belt.
1—30", 70' Long, with driving mechanism.

COAL WASHING EQUIPMENT
2—Rheolaveur Launders, complete with Steel Supporting Frame.
1—60" dia. Dividing Table, direct connected to 2 HP D.C. Motor.
1—Galigher Auto. Sampler with adjustable stroke and direct connected to a 1/6 HP Motor.
1—12'x10' Steel Hopper Bin.
1—70'x12' Dorr Thickener Tank, complete with mechanism.

COMPLETE LISTING MAILED UPON REQUEST
(All Prices Reduced 10% to 15%)

FLORENCE MACHINERY AND SUPPLY COMPANY

SUITE 904, EQUITABLE BUILDING — **DENVER 2, COLORADO**

C. J. PARRISH, MGR.

Available for Immediate Delivery

SET UP AS OPERATED PERFECT CONDITION

750 KVA UNAFLOW ENGINE GENERATOR SET, right-hand, consisting of:
1—750 KVA G.E. Generator ATB-150 RPM. Form E. 600 KW 3/60/2300V. .8 PF.
1—Filer & Stowell 26x36 non-condensing Unaflow Engine. 175# steam. 10# back pressure.
Complete with Exciter, Switchboard and Accessories. May be reconnected to 220 or 440 volts.
Murray CROSS DRUM WATER TUBE BOILER, built in 1946 for 225# pressure. 33,000# steam per hour. 3 unit American Perfect Stoker. Thermix Stack. Fans & Motors. Control Panel.
Ingersoll Rand FS-1 12x14x13 STEAM DRIVEN COMPRESSOR. 3 years old.

All above subject to detailed inspection and priced for quick sale.

Send all inquiries to

CONSOLIDATED PRODUCTS COMPANY, INC.

13-21 Park Row — **New York 7, N. Y.**
Telephone - BArclay 7-0600

SUBSTATIONS FOR SALE

Rotary Converters; Motor-generator Sets; Rectifiers; with transformers and switchboards. Motors, Control, etc. Attractively priced. Send us your inquiries.

R. H. BENNEY EQUIPMENT CO.
5024 Montgomery Road — Norwood, Ohio

MOTOR GENERATORS
1—500 KW G.E. Syn. 575 V. 900 RPM
1—400 KW WEST. Syn. 575 V. 720 RPM
2—300 KW G.E. Syn. 275 V. 1200 RPM
1—200 KW G.E. Syn. 275 V. 900 RPM
1—150 KW G.E. Syn. 275 V. 1200 RPM

SYNCH. CONVERTERS
1—500 KW West. 275 V. 1200 RPM
1—300 KW G.E. 575 V. HCC 1200 RPM

GENERATOR ARMATURES
1—500 KW G.E. 275 V. MPC Form L 900 RPM
1—600 KW G.E. 575 V. MCF Form H 900 RPM

CONVERTER ARMATURE
1—300 KW G.E. 575 V. HCC Form P 1200 RPM

LOCOMOTIVES
2—30 T JEFFREY 250 V. MH-77 48-36" Ga.
1—20 T JEFFREY 250 V. MH-77 48-36" Ga.
3—13 T JEFFREY 250 V. MH-2110 42-32" Ga.
1—13 T G.E. 250 V. MH-827 44-36" Ga.
1—13 T WEST. 250 V. ML-908-C 44-36" Ga.
1—10 T JEFFREY 250 V. MH-110 44-32" Ga.
1—8 T G.E. 250 V. HM-839 44-36" Ga.
1—8 T WEST. 250 V. ML-906-C 44-36" Ga.
1—6 T WEST. 250 V. ML-903-B 32-22" Ga.

LOCOMOTIVE MOTORS
3—JEFFREY 250 V. MH-77, Ball Bearing
2—G.E. 500 V. HM-820-A, Ball Bearing
2—WEST. 250 V. ML-908-C, Ball Bearing
2—WEST. 250 V. ML-907-C, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
2—WEST. 250 V. ML-901-C, Ball Bearing
2—G.E. 85/125 V. HM-828-A, Ball Bearing

WALLACE E. KIRK CO.

501 GRANT BUILDING — **PITTSBURGH, PA.**

EQUIPMENT IN STOCK

MINING MACHINES:
Jeffrey, Goodman, Sullivan, D.C. and A.C., 3 phase.

LOCOMOTIVES:
Jeffrey, Westinghouse, General Electric, Goodman, Ironton.

SUBSTATIONS:
Motor Generator Sets, Rotary Converters.

MOTORS:
D.C. and A.C., 3 Phase.
1—Synchronous 145 H.P., 600 RPM Western Electric type ATA12-150 440 volt, can be rewound—direct connected exciter.

SPARE ARMATURES:
For Locomotives, Machines, Rotary Converters and others.

TRANSFORMERS:
3 phase and single phase, also rotary.

MACHINE TOOLS:
CONVEYORS,
LOADING MACHINES,
PUMPS,
COMPRESSORS,
GENERATORS,
WELDERS.

GUYAN MACHINERY CO., LOGAN, WEST VIRGINA

FOR SALE

CRUSHERS

1—18"x18" Link Belt Double Roll Crusher.
1—30"x36" Jeffrey Single Roll Crusher.
1—30"x36" Link Belt Double Roll Crusher.

HOISTS

1—Wellman Engineering Company single drum hoist, 10' in diameter, 7' face, 1-5/16" between peaks, 5½" flange, 1¼" rope, 870' per minute. Complete with a 400 HP Westinghouse motor, 2,200 volts, 3 phase, 60 cycle, 250 RPM, type HF, and GE automatic control, CR2124 for mine hoist service, 2,200 volts, 400 HP.

1—Ottumwa Iron Works, single rigid cylindro-conical drum hoist, serial ☰ 4080, weight 43,000 lbs. 1⅜" rope, complete with remote control and hydraulic brakes direct connected to Western Electric 150 HP. motor, model 17815, type MT-504-10-150-720, form B, 3 phase, 60 cycle, 440 volts, slip ring, secondary volts 388, amps. 187, secondary amps. 182, speed full load 709, serial ☰4563312, continuous 40° C. Complete with controller and resistance.

1—Ottumwa Hoist ☰3561, drum diameter 48", face 36", face grooved for 1" rope, equipped with goul brake 54" diameter, hand operated, single reduction cut spur gears, 19 teeth and 196 teeth, 1¾" pitch, 10" face, drum shaft 7" diameter, drum shaft bearing 7"x14" pinion shaft bearing 4½"x15" ☰ the ring oiling type, direct connected to 100 HP. Westinghouse motor, type CW, 220 volts, 3 phase, 60 cycle, 308.8 amps, 580 RPM, ☰2394853.

LOCOMOTIVES

1—8 ton Goodman ball bearing locomotive, 42" gauge, type 32 AO-4T.
1—4 ton Whitcomb Battery locomotive, 36" gauge.
1—6 ton Jeffrey locomotive, 42" gauge.

RAILS

Truckload and car lots of good second hand 16, 20 and 25 lb. rails.
Carload lots new 12 lb., 16 lb., 20 lb., 25 lb. and 30 lb. rails. Price and delivery information upon request.

MINING MACHINES

1—CLE5 AC, 3 phase, 60 cycle, 220 volt, Sullivan longwall mining machines.
1—Goodman Universal Mining Machine, 112AA, DC, 6½' cutter bar.
1—Jeffrey Shortwall Mining Machine, 35 HB, AC, 6' cutter bar complete with tip turn truck, cable and reel.
1—Sullivan Shearing Machine, Class CH11, DC, 9' cutter bar.
2—Sullivan Longwall Mining Machines, type CH8, 3/60/220 volts, 30" cutter bars.

MOTOR GENERATOR SETS

1—75 KW Westinghouse synchronous motor generator set, DC end, 250 volts, 300 amps, 900 rpm. Direct connected to 125 HP, 2200 volt, 900 rpm, 3 phase, 60 cycle, 28.6 amp. synchronous motor, complete with automatic switchboard and compensator.

50 KW Westinghouse motor generator set, DC end 250 volts, 200 amps, ☰11, type S, field serial ☰621994, commutator, ☰11-17-135B, 860 RPM, compound wound, AC end, 75 HP Westinghouse induction motor, type CS, 3 phase, 60 cycle, 2,200 volts, 18.1 amps. per terminal, 40° C temp. rise, 870 rpm, ☰4364186, complete with switchboard for DC end and compensator for AC end.

50 KW General Electric motor generator set, 256064, type BR, form C, I.S. 350070-39, 200 amps, 250 volts, 1740 RPM, cont. 50° C, direct connected to 75 HP General Electric induction motor, type KT337-4-75-1809 Form B, 3 phase, 60 cycle, 220 volts, 174 amps, 1,750 rpm, ☰4323202, cont. 40° C, complete with manual switchboard and compensator.

ELECTRIC DRILLS

1—Little Giant, AC electric coal drill size 473, 3 phase, 60 cycle, 220 volts, type HPF, serial ☰143532.
3—Dooley Electric drills, AC, 220 volts, new type.

COPPER

Several hundred feet used 500,000 CM Weatherproof stranded copper.
Several hundred feet used 500,000 CM Bare stranded copper.
Several thousand feet used 4/0 Figure 8 trolley wire.
Several thousand feet 1,000,000 CM lead covered copper.
1,800 feet 2/0 3/Conductor rubber covered cable—used.

VIBRATORS

1—Tyler "600" vibrating screen, size 6x16, three deck.
1—Stephens-Adamson 4 x 16 Double Deck vibrator.
1—Link Belt 4 x 16 Double Deck vibrator.
1—Robbins 4 x 10 Single Deck vibrator.

TIPPLE

1—Steel tipple complete with shaker and concrete silos. Capacity 1,000 tons per day.

COAL WASHERS AND CLEANERS

1—Deister Concentrating Table.
1—Stephens Adamson Coal Cleaner.
(Complete information on the two above items will be furnished upon request.)

We are distributors for John A. Roebling's Sons Company wire rope and fittings.

GAVENDA BROTHERS, Inc.

CANTON, ILLINOIS

DIESEL GENERATORS

1200 KW 525 V DC All. Chalm. dir. conn. 1600 HP GM 16-278A.
650 KW 240 V DC Elliott driven by 900 HP GM 12-567.
290 KW 120/240 V DC Whse. dir. conn. 350 HP GM 8-268A
125 KW 120/240 V DC dir. conn. 215 HP Superior VDMB, 600 RPM.
100 KW 120/240 V DC All. Chalm. dir. conn. 150 HP GM 3-268A.
100 KW 120/240 V DC Delco dir. conn. 152 HP Superior GDB-8.

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31 Nassau Street **New York 5, New York**

REctor 2-1334

MINE HOISTS: 1—All steel single drum 8' dia., 1⅛" rope, 64,000 lbs. single line pull, 600 FPM, 400 H.P., 2,200 volts, A.C., with all control equipment.

1—250 H.P. single drum 7'3" x 5', 30,000 lbs. single line pull, 750 FPM, complete.

1—200 H.P., single drum, 42" face, 60" dia., A.C., 2200 volts and controls.

1—150 H.P., double drum, 38" dia., 42" face, 440 volt, A.C., complete with controls.

A. J. O'NEILL

Lansdowne Theatre Building
LANSDOWNE, PA.
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2—Westinghouse 13 Ton Type 908C haulage locomotives, 250 Volts, D. C. Equipped with ball bearing motors, G. E. Edge-wound resistance, 44" track gauge, now in service at Moncio, West Virginia and in first class condition. Price 50% of present cost of new equipment.

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SHARPLES, W. VA.

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Buckeye Model 224, 26' Deep, 72" Wide.
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Austin Model 105, 1-8½' Deep, 24" Wide.
Cleveland Model 95, 5½' Deep, 18-24" Wide.
Cleveland Model 140, Diesel.
P & H Model 10-30, 12' Deep, 24-32" Wide.
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Buckeye Model 70, ¾ yard Shovel Front.
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Bucyrus-Erie Model S-122, 16 yd. Scraper.
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Excellent Condition
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1946 ¾ yd. Northwest Shovel, Mod. 25, Int'l eng.
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1946 Caterpillar Tractor DS, Cat. bulldozer.
1936 Caterpillar Tractor RDS, Cat. dozer.
1937 Caterpillar Tractor DS, LeTourneau bulldozer.
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NORTON, VIRGINIA

Hotel Norton — Phones 608 & 300

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1—4-Track Wood & Steel Tipple, equipped with deduster—in fair condition.

West Virginia Coal & Coke Corporation
Omar, West Virginia

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Other scales to 50 ton capacity. All scales complete with structural steel weighbridge. Replacement parts for most all makes of scales.

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We have approximately 100 machines on the floor, ranging in screening area sizes from 2'x5' to 5'x14' with 1 to 5 decks. Eccentric weight or positive throw eccentric shaft types.

Prices range from $395.00

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Troughing — idler conveyors — picking tables — Lengths from 10' to 500', widths to 60".

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All steel construction, no cast-iron, interchangeable with other well-known makes of idlers. Precision ball bearings with alemite fittings. Bearings are replaceable. Shafts run clear through, and no bearing adjustments are required. Easy to start and will run in cold weather. No grease seals, but alemite fittings. Ball races are rust proof; maintenance is negligible. If you want to build your own conveyors we have all parts, including standard sections, head and tail pulleys, take-ups, drives, idlers, speed reducers, sheaves, belting, etc.

3-roll Idlers:

16" belt	$19.00	14" belt width	$18.50
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36" belt	23.00	32" belt	22.00
		42" belt	24.00

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More than 2000 mines have Bonded equipment. Send for catalog and prices of new and rebuilt machines. Guaranteed equipment—immediate shipment from large stocks at reduced prices.

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25 cy. 60 cy. D.C.

ALL VOLTAGES 1-1500 H.P.

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BOUGHT and SOLD

ELECTRIC EQUIPMENT CO.

ROCHESTER 1, N.Y.

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BARGAIN—FOR SALE

100 KW. DIESEL ENGINE GENERATOR SETS

10—100 KW, 250/375 V D.C. Delco Generators dir. con. to 150 HP., Model GBD-8, 5½x7, 8 cyl. Superior Diesel Engines, elec. starting with muffler, power panel and accessories.

1—100 KW 220/440 V A.C. same as above. Practically as good as new—Only Used for Spares.

MOTOR GENERATOR SETS—250 V. D.C.

Motors 220/440 volt or 2200 volt—3 phase, 60 cycle

No.	KW	Make	RPM
3	350	Westinghouse	1200
1	300	Westinghouse	720
2	200	Westinghouse	1200
1	150	Westinghouse	700
1	100	General Electric	900
1	100	Westinghouse	600
1	100	General Electric	1200
1	100	Reliance	580
1	100	Delco	1200
3	90	Westinghouse	900
6	75	Westinghouse	720
1	75	Westinghouse	1200
1	60	Westinghouse	1200
1 NEW	50	General Electric	1800
3	40	Westinghouse	900
2	30	Westinghouse	720

125 V. D.C. M.G. Sets

1—100 kw. G.E. 125 v. 900 rpm. 220/440 v. 3 ph. 60 cy. AC syn.

1—125 kw. G.E. 125 v. 1200 rpm. 220/440 v. 3 ph. 60 cy. AC.

1—75 kw. West. 125 v. 1200 rpm. 220/440 v. 3 ph. 60 cy.

HOISTS

1—Welen—2 drum 8000# per drum, each drum is 6' clr. with 430 ft. of ¾" cable per drum can be increased to take 600'. 130 FPM per drum, driven by 25 HP., 1750 rpm., 220 v. D.C. Mtr.

HOISTS OR WINCHES

200—1½ ton Hand Cranked ratio 27.1 thru an enclosed double reduction gear unit with 6 planetary gears mounted on steel plate complete with 48' of ¾" cable, ratchet type brake, push button release.

CAR PULLERS

100—Brand New with ¾" cable, 1½ and 2 ton A.C. or D.C. Motors.

SLIP RING MOTORS—3 ph. 60 cy.

No.	H.P.	Make	RPM	Volt
1	1000	G.E.-MT	900	2200/440
1	800	G.E.-MT	900	2200/440
2	800	West. Cw	597	6600
1	600	G.E.-MT415	900	2200/4000/220/440
1	350	West. CI	1150	220/440
1	250	Allis Chal.	870	2200
2	250	West. CI	1150	220/440
1	250	West. CW	1200	220/440
1	200	West. CW	1800	220/440
1	150	West. CW	1150	2200/220/440
1	125	West. CW	900	2200/220/440
1	100	West. CW	720	2200/220/440
1	100	Triumph C-17	580	550/440/220
1	75	G.E. I-M	720	220/440
1	75	West. CW	1800	220/440
1	60	West. CW	900	220/440
1	60	G.E. IM	720	220/440
4	50	West. CW	870	2200/220/440

230 V. D.C. MOTORS

Qua.	HP	Make	Type	Speed
2	200	West.	—	900
2	200	Reliance	—	400
1	150	West.	SK	1400
6	100	Reliance	—	400
1	100	West.	SK	500
1	100	West.	SK	640
1	100/125	West.	SK-190	560
1	100	West.	S	625
1	100	G.E.	RC	650
1	90	West.	SK	575
1	80	West.	76A	450
1	75	Allis Chal.	—	800
5 New	75	Cr. Wh.	WP	800
1	75	West.	SK	1100
1 Vert.	75	West.	SK	1100
1	75	West.	—	1100
1	60	West.	SK	1750
1	60	West.	SK-153	850
1	60	West.	S	900
1	60	West.	SK-150	875
1	50	West.	SK-143	850
1	40	West.	MC	625
2	35	Allis Chal.	—	1800
1	30	G.E.	LC	530
1	30	West.	SK	975
1	30	West.	S-6	700
1	30	West.	SK-130	725
1	30	Allis Chal.	—	950
1	30	West.	—	975
1	25	G.E.	CD-123	390
1	25	West.	SK-130	600
1	25	Allis Ch.	—	700
2	25	West.	SK	1100
1	25	West.	SK-129	825
1	25	West.	SK	950
1	25	Fair. Morse	CF	950

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PITTSBURGH (6), PA. MONTROSE 5800

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Westinghouse, 75 KW, 2200 Volt AC, 275 Volt DC, 4000-2300 AC.

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General Electric, 50 KW, 2300 AC Primary, 275 DC Volts.

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12AA Goodman with truck.

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10 Inch—Heavy Section.

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All-Steel, Three Ton Capacity.

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500,000 CM Bare and Insulated.
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All in excellent condition.

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3 ph. 60 cy.

500 KW West. 550 v.—710 HP 2300 v. Syn.
450 KW G.E. 275 v.—2300 v. Syn., 720 RPM
300 KW G.E. Rotary 275 v. with 3-116 KVA 2300/4000 v. Transformers and control.
250 KW West. SK 250 v. 2300 v. Syn., 1200 Rev.
150 KW West. 125-225 HP Ind. 2200/440/220 v.
100 KW West. 275 v.—150 HP Syn. 440/220 v.
100 KW West. 125 v.—150 HP Ind. 2200/440/220 v.
35 KW G.E. 125 v.—50 HP Ind. 440/220 v.
10 KW 125 v.—15 HP Master 440/220 NEW.

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300 HP. West. CW 2300/3/60 600 RPM S.R.
300 HP. G.E. I M 2300/3/60 450 RPM S. R.
150 HP. G.E. KT 220/440 v., 695 RPM.
100 HP. G.E. Type 1 K 2200/3/60 600 RPM S. C.
150 HP. G.E. Syn. 220/440/3/60 600 RPM.
150 HP. West. CS 220/440/3/60 500 RPM S. C.
100 HP. Al. Ch. ARY 2200/3/60 600 RPM S. R.
100 HP. G.E. IM 440/220/3/50 450 RPM S. R.
75 HP. West. SK 153, 230 v. 1150 RPM.
60 KW West. SK 250 v. 1350 RPM Gen.
60 HP. West. CS 220/440/3/60 1200 RPM S. C.
30 HP. West. SK 93, 230 v., 1750 RPM.
150 KW Triumph 250 v. 600 RPM Gen.
150 KW G.E. 550 v. RC 1150 RPM Gen.
125 KW West. SK 250 v., 600 RPM Gen.
100 KW West. SK 250 v., 600 RPM Gen.

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1—100 KVA All. Ch. 2200 v.—220 v.
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3—50 KVA G.E. 2400 v.—240/480 v.

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Haulage and Gathering

20-25 Ton G.E. outside 4" armorplate frame, steel tires, 3HM. 824 BB Motor, 125 HP. each, 500 v., 42 or 44" Ga.

15 ton Jeff. MH110 8td. R.R. Gauge.
13 ton West. 26 or 40" Ga., 250 v.
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8 ton Goodman 250 v. 42/44" Ga.
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6 ton West. 250 v. 904 Motors 30" Ga.
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6 ton GE. Permissible BB Motors, 36/44" Ga.
5½ ton Ironton Type A 36/42 Ga.

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50 HP Heyl & Patterson sgl. fixed drum, 4' dia.

PROMPT SHIPMENT ON ALL SIZES A. C. AND D. C. REBUILT MOTORS.

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Aerial Tramway

Continuous carrier type Interstate Tramway, approximately 5,200 feet long, with 7 intermediate supporting towers. Capacity 100 tons per hour. Top track cables 1¼" diameter, bottom return track cables ⅞" diameter. Material carried in 42 steel cars joined with 1" diameter haul rope. Cars hold capacity of approximately one ton.

Unit driven by 125 H.P. 440 volt, 3 phase, 60 cycle Motor. Electric control systems govern feeding and discharge dumps automatically.

Also one single carrier type tramway with span of approximately 660 feet, using single 80 cu. ft. capacity car operating on two parallel 1⅜" dia. track cables. Rated capacity approximately 125 tons per hour, driven by a 25 H.P. 440 volt, 3 phase, 60 cycle Motor. This unit takes material from the continuous carrier and dumps automatically about 100 ft. above ground. Both ends anchored in concrete blocks with intermediate 100 ft. Pivot Tower.

This is a rare opportunity. Tramway in perfect working condition and can be seen in actual operation at Eden, Vt. Relocation of mill will make its use unnecessary, after January 1, 1950.

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One 5½ ft. Symons Short Head Cone Crusher. Shop Number 598. In good operating condition. Driven by 200 H.P. Synchronous Motor (Motor not available).

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One Ruggles-Cole Class XF-12 Rotary Dryer arranged for parallel flow of materials and gases. Shell 80" dia., 60' long made of ⅜" plate and lined with 5/16" liners, complete with exhaust fan and drive. Rated capacity of 50 to 100 tons per hour. Power required is a 50 H.P. for Dryer and 30 H.P. for Exhaust Fan. Address replies to Michael J. Messel, Superintendent, The Ruberoid Co., Hyde Park, Vermont, or to our New York office.

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2—112 G.3. Goodman Universal 220 V. A.C.
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4—612 Goodman Universal A.C. 220 V.
4—258 Jeffries Machines 250 V. D.C.
6—CE7 Sullivan Machines A.C. and D.C.
1—7B Sullivan Machine 250 V. D.C.

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2—4 Ton Goodman Type 33 Ball Bearing
4—8 Ton Goodman Type 32 Ball Bearing, 36 and 42 Inch Gauge
2—6 Ton Goodman Type 2600 Ball Bearing
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1—6 Ton Mancha Storage Battery Locomotive, 36 and 42 Inch Gauge, Height 43 inches. Complete with Storage Battery and Charging Panel
2—4 Ton Westinghouse Ball Bearing

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4—8 B.U. Joys, 36 and 42 Inch Gauge on Cats A.C. and D.C.
3—5 B.U. Joys, 42 Inch Gauge on Cats D.C.

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International Boilers, Scotch Marine type, 200 HP, 125# Steam Pressure, ASME code. Coal Fired, Kewanee Firebox Boiler, "500" Series, Hi Pressure, Heavy Duty, Riveted, for Hand Fired Coal, 125# Steam Pressure, ASME code.

R. GELB & SONS INC.
Union, N. J.

FOR SALE

1—200 H.P. High Pressure Boiler.
1—175 H.P. Steam Engine.
1—40 H.P. 3-Phase, 440-Volt, 600 R.P.M. slip ring motor, with remote control starting panel.
1—8" Water Pump with 3 Phase, 2,300-Volt Motor.
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Also few small H.P. Pumps.

Drake Electric Service
Marshall, Illinois

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2—Ax-7 yd. Bucyrus-Monighan Red Arch Dragline Buckets with teeth and chains. A-1 condition.

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Oskaloosa, Iowa

Lot Good Stripping Equipment. Users ran out of coal.
Osgood Diesel Shovel, 45' boom, 25' sticks, 2 yd.
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20 ton Ohio 8-wheel Steam Crane, Gen. for Magnet. $2,000.00.
25-ton 8-wheel Steam Crane, $1,500.00.
Both have Bettendorf Trucks.

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FOR SALE

2 yd. Osgood 1006 stripping shovel; General ¾ yd. shovel; D-8 Caterpillar bulldozer and carryall; 4" cent. pump; and single drum hoist.

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Joy-Sullivan 7-B, 250 V D.C. Mining Machines with 8'6" Bowdil Bar and Chains.
Joy T-1 Mining Machine Truck, 250 V D.C.

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Cable Repair Kits

Type No. VDIR4 Vulcanizers.
Mfg. by Mines Equipment Co.
Price $59.95 Per Complete Kit.

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New 10 ft. dia. — Bicycle Wheel Type complete with shafts and bearings. 6 @ $1,250 ea. f.o.b. Somerville, N. J.

FS 8798, Coal Age,
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1—20,000# Dbl. Drum Mundy w/o motor
1—35,000# Nordberg Sgl. Drum
1—10,000# Nordberg Sgl. Drum AC
1—17,000# Ottumwa Sgl. Drum AC
1—11,000# Ottumwa Sgl. Drum AC
1—16,000# Allis Chalmers Sgl. Drum
1—30,000# Allis Chalmers Sgl. Drum AC
1—11,000 Allis Chalmers Dbl. Drum AC

Crushers

1—12x16 Eable Dbl. Roll
1—18x20 Eagle Dbl. Roll
1—3B American Pulverizer
1—30x54 McNally Pitts. Sgl. Roll
1—24x20 Penna. Sgl. Roll
1—24x20 Dixie Hammer Mill
1—#75 Marcy Ball Mill

Diesel Generating Equipment

Units, 60 to 1250 KW with diesel engines.

HAWKINS & CO.

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TELEPHONE HARRISON 7-0725

FOR SALE

50 ton Whitcomb diesel elec. switching locomotive. New 1942.
30 ton Whitcomb diesel locomotive. Type 0-4-0. Built 1942.
3½ yd. Lima 1201 diesel crawler dragline, 100 ft. bm. New 1947.
2½ yd. Northwest 80-D diesel shovel. Murphy engine. Built 1941.

MISSISSIPPI VALLEY EQUIPMENT CO.

511 Locust St. St. Louis 1, Mo.

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Belt, Bucket, Drag or Gravity
Shaker & Vibrating Screens
Truck Scales — Coal Crushers
Coal Drills — Car Pullers —
Mine Fans — Electric Motors
Floor Cranes — Mining and
Stripping Equipment

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NEW—Gemco 20" S.G. Crank Shaper. Rapid traverse. Niles, B. & Pond 200 tons Hydr. Horiz. Wheel Press. Chicago Tramrail 1 Ton Crane w/Electric Hoist. 15' travel on I-beam, 14'9" upright.
Canton ±8 Portable Gooseneck Chain Hoist, 3 tons cap.
Franklin 2 Tons Portable Gooseneck Chain Hoist.

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4 Bullivan Class 7B Cutting Machines, with 50 HP AC motor, 3 phase, 60 cycle, 220 volt, and Bowdil cutter bar and chain, 9 ft. long, 8" kerf.
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42"	5	1/8" — 1/16"	20"	5	1/8" — 1/32"
36"	6	1/8" — 1/16"	20"	4	1/8" — 1/32"
30"	6	1/8" — 1/16"	18"	4	1/8" — 1/32"
30"	5	1/8" — 1/16"	16"	4	1/8" — 1/32"
26"	5	1/8" — 1/32"	14"	4	1/16" — 1/32"
24"	5	1/8" — 1/32"	12"	4	1/16" — 1/32"

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	16"	6	10"	5	5"	5
	14"	6	8"	6	4"	5
	12"	6	8"	5	4"	4
	12"	5	6"	6	3"	4

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1"	25 "	10.00	1.50 Pair
	50 "	20.00	1.50 Pair

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1"	25 "	6.25		50 "	15.00
	50 "	12.50	1½"	25 "	10.00
1¼"	25 "	7.50		35 "	14.00
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COAL AGE ADVERTISERS IN THIS ISSUE

An asterisk preceding manufacturer's name indicates detailed information may be found in the 1948-49 MINING CATALOGS

*Air Reduction Co. 37
Ajax Flexible Coupling Co., Inc. 189
*Allis-Chalmers Mfg. Co. 36, 44, 65
*Allis-Chalmers Tractor Div. 10-11
*American Cable Div. of American Chain & Cable Co. ..... Third Cover
*American Car & Foundry Co. 21
American Crucible Products Co. 183
*American Cyanamid Co. ..... Insert between pp. 44-45
*American Hoist & Derrick Co. 184
*American Manganese Steel Div. 170
*American Mine Door Co. 199
American Optical Co. 40
*American Pulverizer Co. 6
*American Steel & Wire Co. ..12-13, 128-129
Anaconda Wire & Cable Co. 133
Armco Drainage & Metal Products, Inc. 166
Atlas Powder Co. 35
Aurora Pump Co. 199

Baker-Raulang Co. 171
Baltimore & Ohio Railroad 151
*Barber-Greene Co. 124
*Bemis Bro. Bag Co. 182
*Bethlehem Steel Co. 47, 54
*Bird Machine Co. 7
Bituminous Casualty Co. 184
*Bixby-Zimmer Engrg. Co. 187
Bonded Scale Co. 190
Boston Woven Hose & Rubber Co. 147
*Bowdil Co. 16
Bucyrus-Erie Co. 169
Byron-Jackson Co. 121

Cambridge Wire Cloth Co. 189
Campbell Co., E. K. 191
Cardox Corp. 117
Carter Products Corp. 190
Caterpillar Tractor Co. 101
Central Mine Equipment Co. 52
Cheatham Electric Switching Device Co. 198
Chesapeake & Ohio Railway 14
Chevrolet Motor Div., General Motors Corp. 66
Chicago Perforating Co. 198
*Cincinnati Electrical Tool Co. 199
Cincinnati Rubber Mfg. Co. 135
Clarkson Mfg. Co. 34-35
*Crane Co. 175

Davis Co., Nelson L. 157
Diamond Supply Co., Inc. 154
*Differential Steel Car Co. 62
Dodge Div., Chrysler Corp. 56
Dodge Manufacturing Corp. 161
*Dravo Corp. 187
*du Pont de Nemours & Co., E. I. (Rayon Div.) 17

Eastern Constructors, Inc. 64
Eaton Mfg. Co. .. Insert between pp. 52-53
*Ensign Bickford Co. 68
*Enterprise Wheel & Car Corp. 57
Erie Mfg. Co. 149

*Farmers Engrg. & Mfg. Co. 146
Firth Sterling Steel & Carbide Corp. .. 156
Flexible Steel Lacing Co. 198
*Flood City Brass & Electric Co. 146
Foote Mineral Co., Inc. 201
*Fulton Bag & Cotton Mills 172

Gates Rubber Co. 42
*General Electric Co., Apparatus Dept. 24-25
*General Electric Co., Construction Materials Dept. 180
*Goodman Mfg. Co. 22-23
Goodrich Co., B. F. 1, 103
Goodyear Tire & Rubber Co. 15
Greensburg Machine Co. 178
Gulf Oil Corp. 164
Gulf Refining Corp. 164
Hamilton Rubber Mfg. Co. 107
Harnischfeger Corp. 45, 141
*Hazard Insulated Wire Works 4
Heil Co. 197
*Hendrick Mfg. Co. 184
*Hoffman Bros. Drilling Co. 201
*Holmes & Bros., Inc., Robt. 152
Hulburt Oil & Grease Co. 2-3
*Humphreys Investment Co., Engineering Div. 170

*I-T-E Circuit Breaker Co. 67
*Independent Pneumatic Tool Co. 167
*Indiana Foundry Co. 198
International Harvester Co. 155

*Jeffrey Mfg. Co. ..Insert between pp. 20-21 ..... Insert between pp. 108-109
Jones & Laughlin Steel Corp. 177
Jones Foundry & Machine Co., W. A. .. 197
*Joy Mfg. Co. ..... Insert between pp. 36-37, 198

*Kennametal, Inc. 46, 123
*Koehring Co. 48-49

*Laughlin Co., Thomas 180
Le Tourneau, Inc., R. G. 60-61
Lima Shovel & Crane Div., Lima-Hamilton Corp. 179
*Link-Belt Co. ..... Fourth Cover
Lubriplate Div., Fiske Bros. Refining Co. 201

Mack Trucks, Inc. 113
Macwhyte Co. 53
McGraw-Hill Book Co. 196
*McGraw-Hill Catalog Service 189
*Mine Safety Appliance Co. 142-143
*Mines Equipment Co. 55
*Mosebach Electric & Supply Co. 185
Mott Core Drilling Co. 170
*Myers-Whaley Co. 58

Nachod & United States Signal Co. 198
Nagle Pumps 185
*National Electric Coil Co. 139
National Homes Corp. 193

Ohio Brass Co. 26-27, 165
*Osmose Wood Preserving Co. of America 168

Paris Mfg. Co. 195
Pennsylvania Drilling Co. 195
Pittsburgh Gear Co. 131
Prox Co., Frank 163

Queen City Machine Tool Co. 195

Ready-Power Co. 182
Roich Bros. Mfg. Co. 195
Reliance Elec. & Engrg. Co. 32-33
Roebling's Sons Co., John A. 59
Rome Cable Co. 43
*Ruberoid Co. 181

S K F Industries, Inc. 153
*Salem Tool Co. 162
*Sanford-Day Iron Works 28-29
*Screen Equipment Co. 173
Searchlight Section 201-207
*Simplex Wire & Cable Co. 39
*Sprague & Henwood, Inc. 187
Standard Oil Co. (Indiana) 18-19
Star Jack Co. 190
Stearns Magnetic Mfg. Co. 178
Sterling Steel Castings Co. 41
Stoody Co. 50
Sun Oil Co. 114
Syntron Co. 186

Tamping Bag Co. 150
Templeton, Kenly & Co. 165
Texas Co. 8-9
*Thermoid Co. 20
Tide Water Associated Oil Co. 127
*Timken Roller Bearing Co. 136

United Engineers & Constructors, Inc. 119
United States Rubber Co. 30-31, 111
*United States Steel Corp. 12-13, 128-129
*Upson-Walton Co. 51

Victaulic Co. of America 148

*Walter Motor Truck Co. 44D
Walworth Co. 44A
West Virginia Bearings, Inc. 191
*West Virginia Steel & Mfg. Co. 188
Westinghouse Electric Corp. ..... Second Cover, 158-159
Whitney Chain & Mfg. Co. 52A
*Willson Products, Inc. 174
*Wilmot Engrg. Co. 63
Wyandotte Chemicals Corp., Michigan Alkali Div. 183

■

PROFESSIONAL SERVICES 192

■

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant 201
SPECIAL SERVICES
Rebuilding 201
Repairing 201
BUSINESS OPPORTUNITIES
Offered 201
PROPERTY
For Sale 201
EQUIPMENT
(Used or Surplus New)
For Rent 201
For Sale 201-207
WANTED
Equipment 201

ADVERTISERS INDEX

A. C. R. Company 204
Atlas Coal Co. 206

Baer Company, S. C. 204
Benney Equipment Co., R. H. 203
Bernhardt, Michael 206
Bonded Scale & Machine Co. 205
Boone County Coal Corp. 204
Bradford Supply Company, Inc. 205

Caryle Rubber Co., Inc. 207
Carroll, Mc. E. W. 204
Central Pipe & Supply Co. 206
Cincinnati Machinery Co., Inc. 202
Coal Mine Equipment Sales Co. 202
Consolidated Products Co., Inc. 203

Drake Electric Service 206
Duquesne Electric & Mfg. Co. 205

Electric Equipment Co. 205
Electric Service Co., Inc. 201

Falk Machinery & Supply Co. 202, 207
Florence Machinery & Supply Co. 203
Foster Co., L. B. 202
Frank, M. K. 202

Gavenda Brothers, Inc. 204
Gelb & Sons Inc., R. 206
Gillespie & Son, Thomas 206
Greensburg Machine Co. 202
Guyan Machinery Co. 203

Hawkins & Company 207

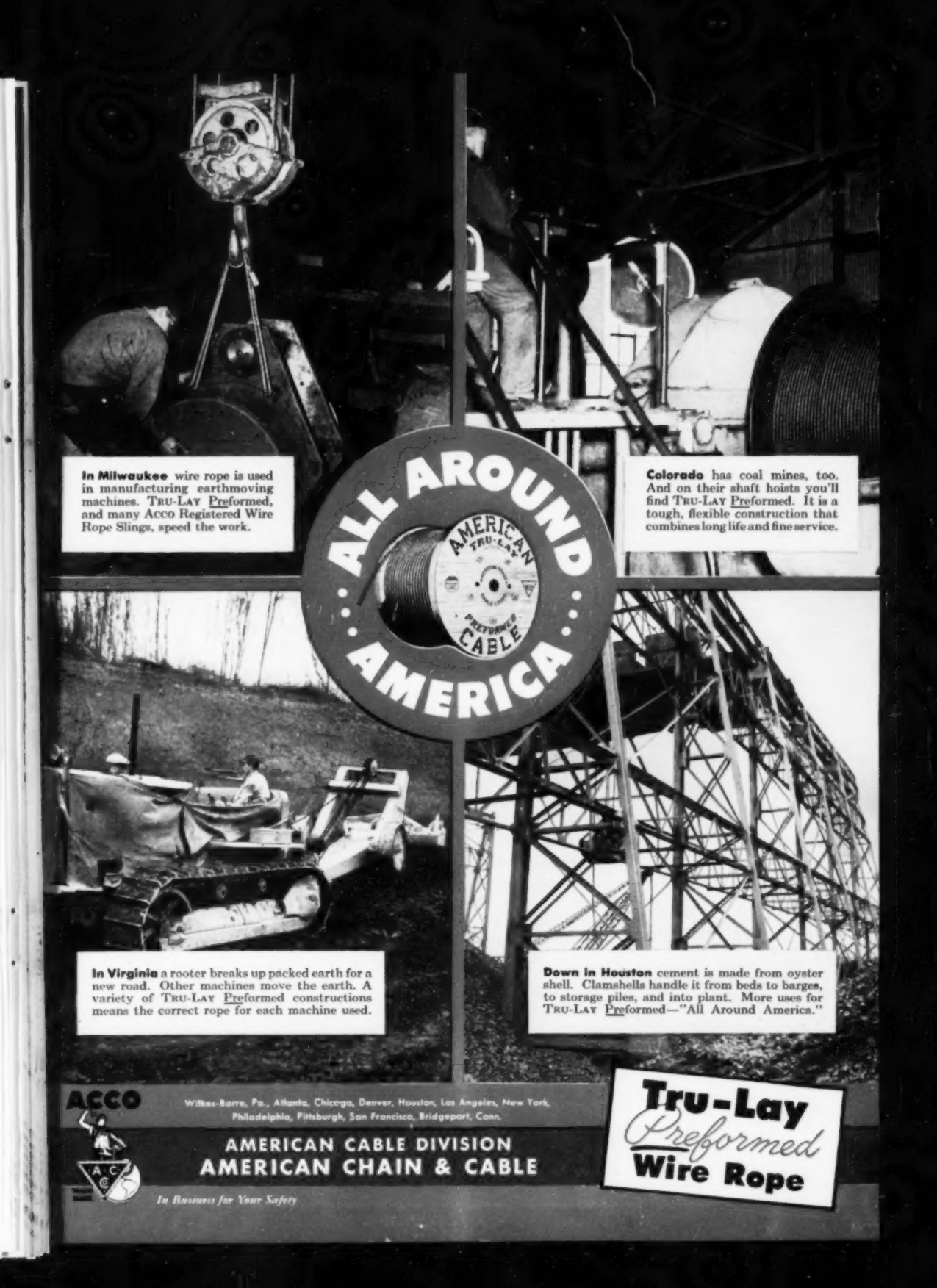
Industrial Equipment Corp., The 207
Interstate Pipe & Supply Co., The 204

Kaiser Co., Inc. 207
Kilman Sales Co., Inc., T. J. 207
Kirk, Donald 201
Kirk Company, Wallace E. 203

Lefton Industrial Corp. 202
Locke Co., C. B. 202
Loris Sales Co. 202

Manshack Metal Co. 205
McCartney Machinery Co. 206
McNees, R. T. 204
Midwest Steel Corp. 202
Mississippi Valley Equipment Co. 207
Moorhead Electrical Machinery Co. 206
Morrison Railway Supply Corp. 202

Neu Corp., Hugo 204
O'Neill, A. J. 204
Ruberroid Co., The 206
Serdino Inc., V. P. 204
Stewart Co., James A. 202
Tennessee Copper Co. 201
Tippins Machinery Co. 202
Wagner, Arthur 204
West Kentucky Coal Co. 206
West Virginia Coal & Coke Corp. 204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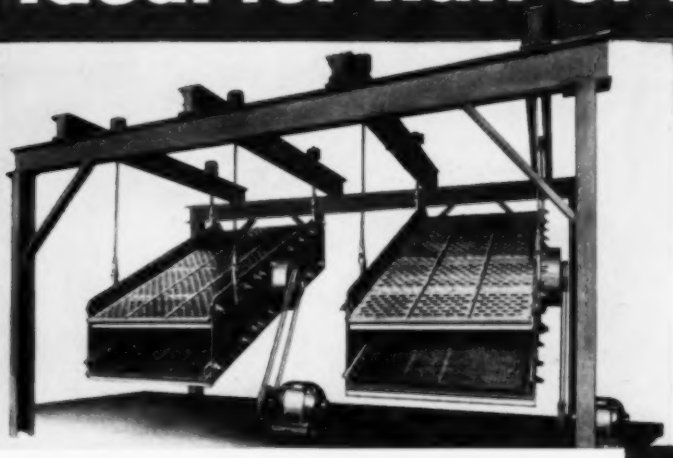

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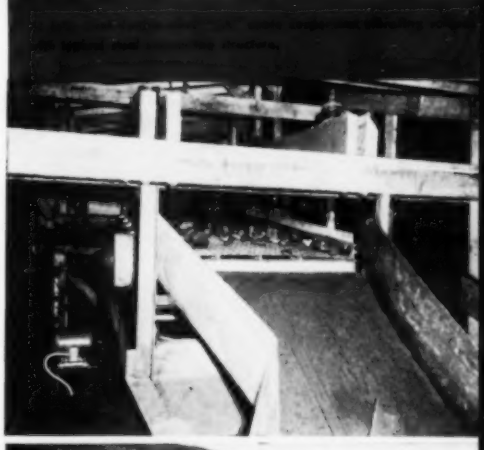

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